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MASTERARBEIT

Sustainability Management Tools in the Energy Industry

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Master's Thesis

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KURZFASSUNG

Nachhaltigkeitswerkzeuge sind Instrumente, die eingesetzt werden, um Nachhaltigkeit in einem Unternehmen zu messen, managen, berichten und strategisch zu planen. Immer mehr Unternehmen in Europa beschäftigen sich damit, nicht nur weil sie es aus Eigeninteresse wollen, sondern auch, weil sie es aufgrund der EU-Richtlinien *Non-Financial Reporting Directive* (NFRD) bereits jetzt oder wegen der *Corporate Sustainability Reporting Directive* (CSRD) ab 2025 müssen. Dieses vor allem in der Praxis noch wenig erforschte Thema hat insbesondere für den Energiesektor, der gemessen an der Branche die meisten CO2-Emmissionen verursacht (Statista, 2022), eine besonders hohe Relevanz.

Ziel dieser Masterarbeit war es anhand eines Grounded Theorie Ansatzes basierend auf systematischen Analysen wissenschaftlicher sowie grauer Literatur und durch Experteninterviews Vor- & Nachteile sowie Erfolgsfaktoren bei der Nutzung und Implementierung dieser Werkzeuge genauer zu beleuchten.

Die Ergebnisse zeigen, dass einzelne Nachhaltigkeitswerkzeuge wesentliche Vorteile, wie etwa die Möglichkeit Nachhaltigkeitsdaten aufgrund ihrer Relevanz in einem Unternehmen zu priorisieren oder diese mit anderen Unternehmen gut vergleichen zu können, aufweisen. Genauso gibt es aber Nachteile, wie etwa ein hoher Kosten- oder Zeitaufwand. Als Erfolgsfaktoren auf organisationaler sowie interorganisationaler Ebene konnten sich beispielsweise die Integration von Nachhaltigkeitswerkzeugen in bestehende Werkzeuge oder Systeme, sowie die Automatisierung von IT-Schnittstellen herauskristallisieren.

Die Erkenntnisse dieser Arbeit sollen letzten Endes insbesondere für Nachhaltigkeitsmanager*innen in der Energiebranche dienlich sein.

ABSTRACT

Sustainability Management Tools are instruments employed for the measurement, management, reporting, and strategic planning of sustainability within an organization. Their adoption is growing among European companies, driven not only by self-interest but also by mandatory compliance with EU directives such as the *Non-Financial Reporting Directive* (NFRD) and the forthcoming *Corporate Sustainability Reporting Directive* (CSRD) from 2025. This under-explored area of research is particularly relevant to the energy sector, since it is the largest contributor of CO2 emissions measured by industry (Statista, 2022).

The aim of this thesis was to employ a grounded theory approach, based on a systematic analysis of academic and grey literature as well as expert interviews, to provide a more comprehensive understanding of the advantages, disadvantages and success factors associated with the adoption and implementation of these sustainability tools.

The findings indicate that individual sustainability tools offer significant benefits, including the ability to prioritize sustainability data based on its relevance within a companies' context and to facilitate meaningful comparisons with other organizations. However, they also have inherent disadvantages, such as high costs and time expenditure. The integration of sustainability tools into pre-existing tools or systems and the automation of IT interfaces, for instance, emerged as success factors at organizational and inter-organizational level.

Ultimately, the findings of this thesis should be of particular use to sustainability managers in the energy sector.

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III. LIST OF ABBREVIATION

CS Corporate sustainability

CSDDD Corporate Sustainability Due Diligence and amending Directive

CSRD Corporate Sustainability Reporting Directive

CSF Critical success factor

CSO Chief sustainability officer

CSR Corporate social responsibility

ESRS European Sustainability Reporting Standards

GHG Greenhouse Gas (Protocol)

GICS Global Industry Classification Standard

GRI Global Reporting Initiative

LCA Lifecycle Assessment

NFRD Non Financial Reporting Directive

SMCT Sustainability Management Control Tools

SM Strategic management

SMT Sustainability Management Tool

SP Sustainability Performance

SPMS Sustainability Performance Measurement Systems

TBL Triple Bottom Line

1 INTRODUCTION

1.1 Problem definition

"It is time to acknowledge that the house is on fire and that—to sustain themselves, and to help sustain all of us—firms must develop strategies to sustain their environments." (Barnett et al., 2021).

As this quote describes, companies have a responsibility to act sustainably, yet an increasing number of them are becoming aware of this. Reasons, why companies engage in sustainability management, arise due to internal or external factors. These two approaches, often defined in the literature as "outside-in" or "inside-out" (Corsi & Arru, 2021), describe either a reactive or proactive response to sustainability pressures (Wijethilake, 2017). Regardless of the actual reason, the number of mandatory reporting obligations such as the recent Corporate Sustainability Reporting Directive (CSRD) of the European Parliament (2022) is constantly increasing, forcing at least large companies to pay attention to their sustainability and to publish relevant information. While reporting standards are external reasons for transparent disclosure, companies also collect data as an internal perspective to monitor their sustainability performance (Corsi & Arru, 2021). To collect this data and make the right strategic decisions for sustainability performance improvement, Sustainability Management Tools relevant for practical application are required (Wijethilake, 2017).

In the literature on this topic, various studies deal with Sustainability Management Tools in general, however, little research is done on how they are actually used in practice. Above all, both academics and practitioners agree that sustainability strategies cannot be successful without the collection and evaluation of data as well as controlling of sustainability targets (Corsi & Arru, 2021). Cooper & Edgett (2008, p. 54) puts it succinctly with the statement: *"you cannot manage what you do not measure"*.

1.2 Relevance for theory and practice

In the literature on Sustainability Management, a multitude of studies have been conducted on Sustainability Management Tools, albeit often with different focuses. Therefore, a large number of mostly scientific publications from the most recent research on the topic of sustainability management and its instruments will be reviewed and compared with each other. The aim is to give an up-to-date overview of the current state of research which should eventually also be relevant to the energy sector.

In the case of a possible discrepancy between tools recommended in theory and those applied in practice, this work can provide food for thought on how to focus future research in this area. For the research on strategic management, this work also contributes specifically to the sub-area of strategic management for sustainability and its measurement.

As market reports show (MarketLine, 2022a, 2022b) global demand for energy increase, also the negative impact of the energy industry will continue to grow as one of the most pressing issues in the years to come (Talbot & Boiral, 2018). This is why, companies in the Energy sector are expected to contribute to environmental sustainability by improving efficiency, reducing carbon emissions, investing in renewable energies, protecting biodiversity, and addressing climate change issues in

general (Shahbaz et al., 2020).

The results of this work are primarily intended to be useful for sustainability managers. By presenting the advantages and disadvantages of various Sustainability Management Tools and their use cases for different levels in an organization, managers should be provided with a compact and concrete overview. This should enable the choice of a suitable tool for the respective situation and subsequently improve a firm's sustainability strategy. Since there is a call to further examine the use of Sustainability Management Tools in practice (Nixon & Burns, 2012), and only very little studies examined this issue in regard to the energy sector (Hassanein et al., 2023), this Master's Thesis is intended to help fill this research gap. The thesis's relevance for practice is achieved by applying adequate methods and interviewing relevant players from praxis. Therefore, the theoretical as well as practical perspective tries to corroborate the thesis's relevance.

1.3 Aims and research questions

This Master thesis aims to analyze the sustainability management of companies in the energy sector and to find out which Sustainability Management Tools should best be used and in which way. Therefore, based on the following research questions, management tools will be examined using different research designs to eventually add value to this field of research.

The guiding questions of this thesis will be as follows:

RQ1: What are Sustainability Management Tools used by incumbent energy providers?

RQ2: What are success factors of Sustainability Management Tools at different levels of incumbent energy providers?

Besides narrowing down the topic by focusing on the energy sector, this research is likely to have increased relevance for companies from Europe due to the selected interview partners.

In the overall process, advantages, disadvantages, and success factors for different use cases and on multidimensional (organizational, sub-organizational and individual) levels are to be determined. In the end, the results should be useful for sustainability managers of companies in the energy sector and provide concrete information on which tools are best suited for certain purposes.

This Master thesis aims to shed light on a variety of Sustainability Management Tools and their applications according to theoretical research as well as insights from practice. Moreover, it should highlight the relevance of Sustainability Management Tools in particular for companies in the energy sector and give guidance for the actual use of these tools.

2 CONCEPTUAL BACKGROUND

This chapter aims to furnish an overview of the most relevant topics regarding Sustainability Management Tools. The following subchapters on strategy tools, sustainability, Sustainability Management Tools and the energy industry will provide a general understanding of the definitions used in this thesis, as well as background information, theories, and frameworks of the empirical research.

2.1 Strategy tools

2.1.1 Definition

Strategy is a buzzword that is used and defined by an enormous number of academics. According to Yu (2021), there are over 90 of them in the scientific literature. However, almost all of them are based on the publications of the four gurus Chandler (1962), Andrews (1971), Porter (1996) and Mintzberg (1987a, 1987b). Among these definitions, the following keywords are particularly noteworthy for describing the term.

Strategy follows a „*long term goal*" (Chandler, 1962), it „*[...] defines the range of business the company is to pursue, the kind of economic and human organization it is or intends to be*" (Andrews, 1971) and can be seen as "*a plan - some sort of consciously intended course of action, a guideline (or set of guidelines) to deal with a situation*" (Mintzberg, 1987b). According to Porter (1996) the aforementioned goal of strategy is to eventually "*find competitive advantages*" or create „*a unique and valuable position*".

In addition, a *strategy* or *strategic tool* is most commonly used as an umbrella term for *"numerous techniques, tools, methods, models, frameworks, approaches and methodologies which are available to support decision making within strategic management*" (Clark, 1997, p. 585f) Put differently, such tools are used in all possible ways to assess and measure a firm's strategy.

2.1.2 Background, approaches & theories

In general, strategic tools are used by managers to make the right strategic decisions. They are primarily intended to help and guide decision makers in dealing with uncertainties in business and market analyses and ultimately lay the foundation for a firm's competitive advantage (Wright et al., 2013). Strategic management tools (hereinafter referred to as SM Tools) are used at different stages of the strategic management process. From the assessment of the current situation to the strategic analysis of possible options, and finally to the implementation of strategies, SM Tools support the decision making process in all of these phases (Clark, 1997; Qehaja et al., 2017). In general, SM Tools are used to generate information and to serve as a structured basis for analyses and as reasons for decisions and their communication (Clark, 1997). The latter is also confirmed by Write et al. (2013) who claims that these tools can "*provide a powerful and persuasive medium for communicating directions for strategic action*" if used properly.

Given their contribution to increasing strategic thinking and the effectiveness of the overall strategic planning process, SM Tools should not be underestimated (Webster et al., 1989). Moreover, SM Tools

can be particularly important at times of uncertainty. They can provide a broader and more accurate understanding of changes in (e)merging worlds and therefore better help managers in their decision-making (Qehaja et al., 2017).

Nevertheless, compared to other areas of SM, tools have received less focus in scientific research. Despite their essential role in supporting along all areas of the SM process, Clark (1997) explains that these tools are "*a means to an end, not an end in itself*". Since these tools do not make a strategy (Hussey, 1998) nor replace it (Porter, 1996), they have a subordinate role in the literature of SM.

2.1.3 Theoretical development & practical perspectives on strategy tools

Looking at the development of SM Tools over time, as shown in Table 1, it was academics such as Porter (1991) who reconsidered their own theories (Porter, 1985) and models and started to take a different approach. This approach aimed to provide information for practice and therefore demanded the development of more structured and accurate tools. Thus, it was necessary to look further than formulating single theories and to replace models with building frameworks. According to Porter (1991), such frameworks "*encompasses many variables and seeks to capture much of the complexity of actual competition*". Moreover, they should enable the identification of relevant variables and questions that need to be answered in order to develop solutions specific to a firm or industry.

Table 1: Development of models, frameworks and tools for SM over time adapted from Campbell et al. (2011)

	1960s-70s	***1970s-1980s***	***1990s***	***Present***
Models/ Frameworks/ Tools	Forecasting, synergies, portfolio analysis (BCG Matrix), product life cycle	Environmental- and industry analysis (Porter's Five Forces), SWOT	Competencies, Capabilities, Resources, Knowledge Management, Value Chain, Learning organization	Innovative capabilities, Adaptive capabilities, Adoptive capabilities, Collaboration, Knowledge management

Over the years, a number of new tools have been developed for strategic management as shown in Table 1. However, according to research by Kachra & Schnietz (2008), the most popular and frequently used tools in the education of management students include Porter's Five Forces, Value Chain, SWOT, Key Success Factors, Stakeholder analysis, Core processes mapping and design, Performance Management (e.g. balanced scorecard), BCG Portfolio Matrix and 7S Framework.

While knowing which tools are taught in strategic management, Wright et al. (2013) wanted to explore which SM Tools are considered useful by managers and why. In order to analyze this and in particular manager's internal logics in the selection and use of specific tools, managers in the final

semester of their MBA programme were interviewed for this purpose. The study showed that SM Tools most frequently were considered useful when they facilitate a better understanding of a firm's competitive advantage against competitors or the interconnectivity of entities. Moreover, tools that help for reaching conclusions and communicating those easily, identifying success factors or generating new ideas were most preferred by managers. Finally, the authors state that complicated tools may be preferred over simple ones to help managers think in more complicated ways and stimulate interconnections between information (Wright et al., 2013).

2.1.4 Strategy tools as boundary objects

According to Solinas (2016), research in the field of strategic analysis has increasingly focused on how strategic tools are used and for what purpose. In particular, the role of tools in the context of sense-making and rationality has been addressed in the literature (e.g. (Balogun & Johnson, 2004), leading to the definition of "*strategy tools as boundary objects*" (Jarzabkowski & Kaplan, 2015; Spee & Jarzabkowski, 2009). Using SM Tools as such tries to bridge the "*gap between the utopia of the mind (the theory of how strategy tools should be used) and the realism of experience (how managers actually use tools)*" (Jarzabkowski & Kaplan, 2015) and thus, falls into the research field of strategy-as-practice (Orlikowski, 2015).

Besides taking a "*sociological eye*" on strategy (Whittington, 2003), which pays attention to the purposes and potential of tools, the drivers for involved managers and the context in which they are used (Jarzabkowski & Kaplan, 2015), the framework of boundary objects provides an answer to "*how and why"* SM Tools are used in interaction across boundaries. In this context, the intended meaning is the interplay between top and middle management, as well as the interaction among distinct hierarchical levels, including divisional, corporate, and business unit levels (Spee & Jarzabkowski, 2009).

This approach seeks not only to examine single tools and decision makers as well as their intentions, but also to incorporate the interactions of all individuals involved in the strategy process (Jarzabkowski & Kaplan, 2015) that eventually can "*enable or constrain interaction across intra-organizational boundaries*" (Spee & Jarzabkowski, 2009).

To begin with, it should be mentioned that SM Tools are boundary objects with regard to the three criteria, syntactic, semantic and pragmatic, all of which demonstrate different difficulties in sharing knowledge (Spee & Jarzabkowski, 2009). Firstly, the syntactic perspective refers to SM Tools that provide a common syntactic basis for discussing and formalizing ideas and actions through a commonly shared language. Secondly, in the case of the semantic criteria, SM Tools as boundaries are used to "*translate knowledge in a unique vector of information*" (Solinas, 2016) that is easy to understand and interpret for decision makers. This most commonly occurs in situations of high uncertainty or when the problem definition is unclear. Finally, the pragmatic perspective can be seen as the most social and political component, since it requires a common interest in sharing knowledge (Spee & Jarzabkowski, 2009). By neglecting the pragmatic feature, individuals may develop ideological particularities and feel committed to other projects, divisions or even institutions (Solinas, 2016).

Based on the literature on strategy-as-practice and boundary objects, Solinas (2016) could derive

the following three most crucial dimensions for tool selection and effective usage: methodology, timing and scope. The first of these factors is methodology, which can be divided into quantitative instruments and qualitative or descriptive instruments. While for quantitative tools a methodology based on numerical data and techniques is used, the second type of instrument relies on qualitative research (Solinas, 2016). The second factor, timing, distinguishes between strategic tools that are intended to facilitate either dynamic or punctuated analysis. Finally, the factor scope enables the classification of tools used to either summarize or separate information.

Another relevant factor is that insights into users' intentions and the effects of using tools for interactions can be gained by concentrating on the actual use. Particularly, users may use the same tool in various ways and for various purposes. Thus, practitioners may be more concerned with using a strategy tool in situations that seem appropriate rather than being concerned about its "proper" use (Spee & Jarzabkowski, 2009). Moreover, tools should be used differently depending on the actual need and context of a firm (Chesley & Wenger 1999) e.g., tools to improve corporate performance or tools for innovation. However, a SM tool can also limit effective communication across organizational levels. This is the case when a tool requires the use of a specific language that is not understood or misunderstood by all individuals. Above all, a boundary object framework helps to adequately handle the problem of interaction boundaries that naturally occur due to hierarchies and organizational roles (Spee & Jarzabkowski, 2009).

2.2 Sustainability

2.2.1 Definition

While the original word derivation of sustainability would mean "*the capacity to maintain*" (Starik & Kanashiro, 2013), most academic sources on the subject cite the definition of the Brundtland Commission (1987). Brundtland Commission (1987) defines sustainable development as *"meeting the (human) needs of the present without compromising the ability of future (human) generations to meet their own (human) needs"*. Although it has been criticized for being too imprecise ever since, the Brundtland definition has served as an impulse for policy makers and academic research to pay more attention to sustainability (Chang et al., 2017). As a result of this criticism, new definitions have emerged, some of which are cited in the following chapter.

2.2.2 Background, theories & development

2.2.2.1 Background on most famous definitions & theories

In the 1930s, companies first began to address the issue of sustainability or sustainable development. Different theories, which according to Chang et al. (2017) can be summarized in the superordinate theories of corporate social responsibility (CSR), stakeholder theory, corporate sustainability (CS) and green economics, have developed since then.

CSR

The first theory to deal with this topic in the context of corporations was introduced in Bowen's book on *Social Responsibilities of the Businessman* (1953). This CSR theory essentially considered the

obligation of businessmen to make decisions in the interest of society. At the time, Bowen's theory was not widely accepted and met with much criticism. In the meantime, other theories and definitions of CSR emerged (Chang et al., 2017), most notably Carroll's (1979) Three-Dimensional Conceptual Model of Corporate Performance. This theory is mainly concerned with social values and divides CSR into the four categories "*economic responsibility, legal responsibility, ethical responsibility and discretionary responsibility*" (Carroll, 1979). Also Drucker (1984) strongly influenced the theory of CSR, defining it as a concept "*to tackle the major social challenges facing developed societies*".

Stakeholder Theory

The next overarching theory to emerge was stakeholder theory in the late 1970s. Its definition was mainly coined by Freeman (1984) and is still one of the most widely used theoretical frameworks in the field of corporate sustainability research (Corsi & Arru, 2021). This approach essentially expanded the concept of stakeholders to include additional stakeholders such as environmentalists, governments, and special interest groups and, thus, differentiates between primary and secondary stakeholders. Primary stakeholders include the traditional stakeholders who have a more direct influence on a company than the secondary stakeholders, which are the aforementioned extended stakeholders (Chang et al., 2017). In contrast to the shareholder approach, which primarily aims to maximize financial profit, this approach tries to incorporate the needs of all stakeholders and to ensure a long-term survival in the market (Hasnas, 1998).

Corporate Sustainability

Since the Brundtland definition (already cited in chapter 2.2.1), aspects of environmental sustainability have also become the focus of theories and models. The umbrella term for these theories and models is referred to as corporate sustainability (CS). Numerous definitions have emerged for this term, whereby it is mostly operationalized by Elkington's (1997) concept of the Triple Bottom Line (TBL). Besides meeting stakeholder needs, this model also aims to address the economic, social as well as the environmental dimensions of business performance (Chang et al., 2017). Elkington (1997) writes that in the 1990s, despite increased attention in academia, sustainable development was still equated with a communist concept by some influential people in the business world. Particularly due to the World Business Council of Sustainable Development, however, the concept of "eco-efficiency" and thus the environmental bottom line was able to spread alongside the economic bottom line. Including the social perspective as a third perspective, the model of the triple bottom line can today be described as *"focus on economic prosperity, environmental quality, and [...] social justice"* (Elkington, 1997). Companies that integrate the triple bottom line in their business model and take all three dimensions into account can be described as sustainable business models (Chang et al., 2017). Regarding the responsibility of all members of a society in regard to global sustainable development, corporate sustainability refers to the contribution that companies make to the global environmental challenges (ISO, 2010). To successfully pursue these goals in the long term, companies need to bring their activities in line with sustainable development and fulfil their responsibility towards society on an institutional, organizational and individual level (Orlitzky & Swanson, 2012). Studies such as Birkin et al. (2009) show that incorporating the triple bottom line into the business model can lead to a competitive advantage.

Green Economics

The concept of a green economy was primarily formed by the United Nations, in particular through its United Nation Environmental Programme (UNEP, 2010) and has been recognized primarily by policy makers. The program's major goals are sustainable development and poverty reduction, with green growth being a prerequisite for achieving these goals. In contrast to the previous theories, the Green Economy is at a macro-economic level and thus, applies to society and governments rather than businesses. One of the basic ideas of Green Economies is to recognize the true value of the ecosystem, which in fact means that economic activities should be more resource efficient and less harmful to the environment. To achieve this goal, market-based instruments such as strict regulations and governmental support for innovation and technology are needed. (Chang et al., 2017). Borel-Saladin & Turok (2013) further identifies instruments to promote better labor market conditions and education, or to improve infrastructure, transportation, or energy. By implementing these instruments, green growth can eventually lead to increased productivity through various factors, such as improved health of employees and energy efficiency (van der Ploeg & Withagen, 2013).

2.2.2.2 Modern Theories

Besides the previously described models and concepts, all of which are among the most famous terms in research on sustainability, some innovative theories have emerged in recent years. Two of these, which have become well-known by now, are discussed in the following paragraphs.

Co-evolutionary theory

Chang et al. (2017) describes the development of companies moving from simply addressing the issue of sustainability towards implementing and measuring management approaches on an ongoing basis as "*shifting from what to how*". The reason for this shift is mainly because of CS guidelines such as the Global Reporting Initiative (GRI) (2022) or obligatory regulations such as the NFRD and CSRD (Verheijke & Anema, 2022) which directly or indirectly force businesses to transparently disclose their corporate performance in regard to sustainability aspects (Chang et al., 2017). The so-called co-evolutionary shift of basic assumptions in strategic management towards a new standard for sustainable strategic management is intended to be closer to reality for both managers and students (Stead & Stead, 2010). Co-evolutionary theory has put Darwin's theory of evolution in the context of economics and management and has become a popular framework for organizational science over the years (Chang et al., 2017). It can be seen as an umbrella theory that combines several well-known organizational theories (Stead & Stead, 2013). One of the main advantages of co-evolution is its evolvement in line with the practice of management (Porter, 2006). Also, Starik & Kanashiro (2013) claim that sustainable theories such as co-evolutionary theory provide greater benefits compared to other management theories by more completely acknowledging the biophysics of humans, organizations, and societies and their interconnectivity with cultures and economies (Starik & Kanashiro, 2013).

Multi-level perspective

While CSR and CS is primarily relevant to the micro level of a firm and its stakeholders, more recent theories such as Green Economics address a broader perspective. Policy makers such as governments

play a relevant role in shaping and changing the economic and socio-political circumstances for companies towards "*sustainability of a broader system*" (Chang et al., 2017). The multi-dimensional perspective can be described as an interaction of sustainability at different levels respectively successive developments of these. Due to changing stakeholder needs towards sustainability (Stakeholder Theory), several firms started to implement sustainability systems in the 1990s, which further led to the development of sustainable business strategies (Corporate Sustainability). Subsequently, policy makers also became involved to regulate sustainability practices (green economics), since the sustainability of individual companies depends not only on the internal controlling of their strategies, but also on industry standards or human resources (Smith et al., 2010). In general, the multi-level perspective assumes that there are innovative niche actors that contribute to a sustainable transformation in a meaningful way and other companies that want to prevent this process. The former are mainly those companies that look further than optimizing CS performance, e.g. by integrating sustainability into their business model. To further promote the sustainability transition, the multilevel perspective argues that efforts should be made to promote sustainability and to restrict existing systems (Chang et al., 2017).

Figure 1: A theory landscape of sustainability and firms (Chang et al., 2017, p. 53)

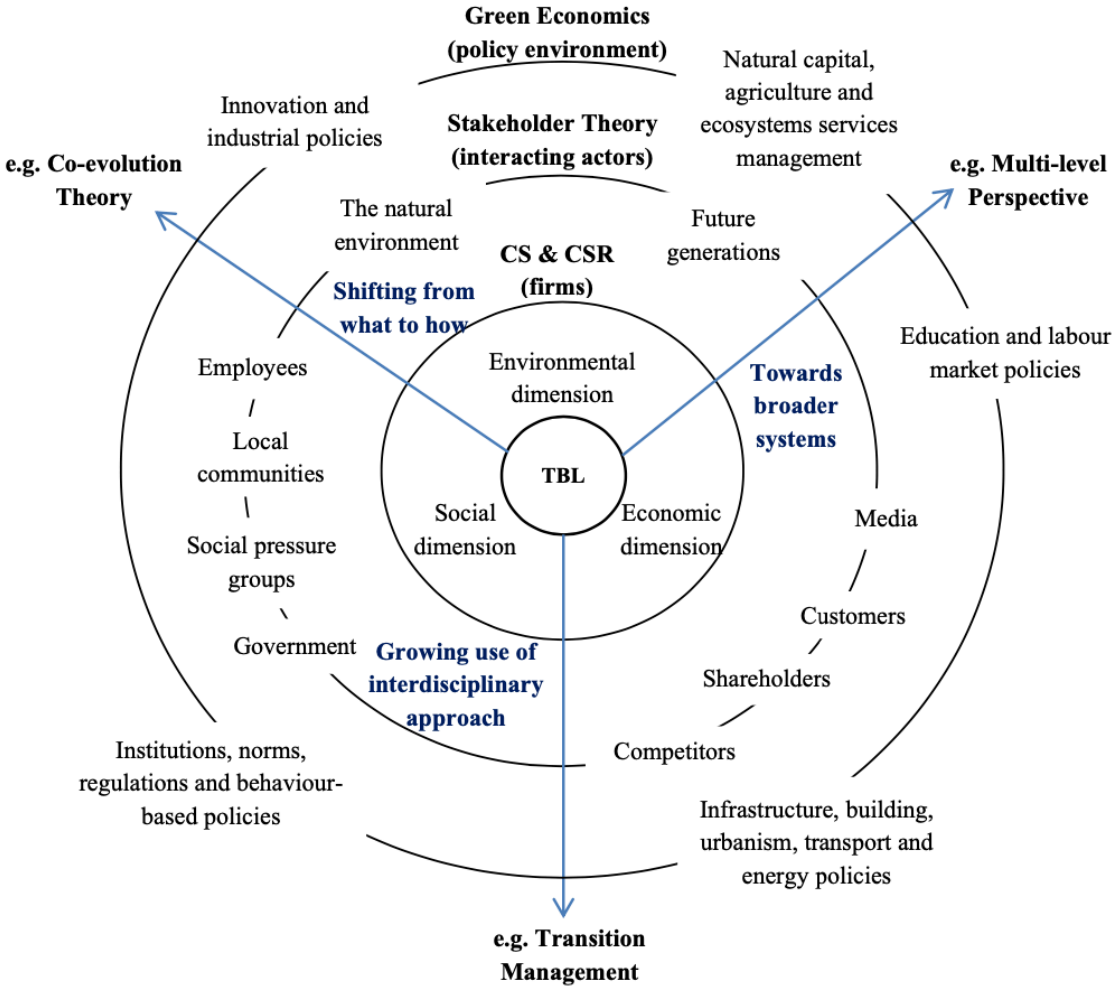


Figure 1 gives an overview of the developments and areas of impact of various theories regarding sustainability. Attention is paid to the different levels in which the four theories *CS, CSR, Stakeholder Theory* and *Green Economics* operate. While CS and CSR are only relevant at the micro level of an organization, the Stakeholder Theory also includes its business environment. Green Economics is on the outermost layer, dealing on a macro-economic level with regulations in areas such as education, infrastructure, agricultural culture, or the ecosystem. Based on the TBL shown in the middle, modern theories such as co-evolution theory or multilevel perspective have further been developed as perspectives combining aspects of the four well known theories described before.

2.3 Sustainability Management Tools

2.3.1 Definition

Besides the umbrella term of "Sustainability Management Tool" (SMT), defined as *"management methods that specifically serve the purpose of implementing corporate sustainability"* by Hörisch et al. (2015), the literature often uses similar terms, such as "Sustainability Management Control Tool" (SMCT), "Sustainability Performance" (SP), Environmental Management System (EMS) and many more. These terms essentially refer to the same types of tools but are categorized differently based on their criteria.

2.3.2 Background & basic aspects of Sustainability Management Tools

"Management not only needs to develop environmental strategies, it also has to use effective Sustainability Management Tools for their implementation" (Hörisch, Ortas, et al., 2015) In order to create a basis for such sustainability strategies, however, it is necessary to know the status quo. As Cooper & Edgett (2008) put it, "*you cannot manage what you do not measure".*

In general, however, SMTs are used since companies are under pressure from both internal and external factors (Corsi & Arru, 2021; Wijethilake et al., 2017). While external pressures can force companies to improve their sustainability disclosure, internal pressures can for instance drive the development of a new sustainability strategy. Authors such as Corsi et al. (2021) apply institutional theory as a response to external pressures, and resources-based view theory as internal motivation, to explain these two "paths" and how they affect the utility of SMTs in sustainability management. In the literature, these two theoretical approaches are defined as "*outside-in*" and "*inside-out*" (Maas et al., 2016).

While companies that follow the outside-in approach only attributing a formal meaning to sustainability, firms that fully integrate sustainability in their overall business strategy are following the Inside-Out perspective (Corsi & Arru, 2021).

The outside-in perspective is driven by external factors such as *"investors, policy makers stakeholders and shareholders […] pressuring companies to consider sustainability performance more seriously*" (Morioka & de Carvalho, 2016). As shown in Table 2, this approach focuses on assessing sustainability to eventually report and disclose sustainable results (Maas et al., 2016). According to Corsi & Arru (2021) Measurement and Accounting Tools are therefore used to collect and transparently communicate data on sustainability to the aforementioned audience. However,

only Accounting Tools for external perspectives are meant in this case, which are relevant "*to collect data for indictors that are directly relate to reporting standards*" (Maas et al., 2016) such as GRI (2022).

Table 2: Key sustainability measurement and management approaches adapted from Maas et al. (2016) and Corsi & Arru (2021)

<table>
<tr><th rowspan="2"></th><th colspan="2">External</th><th colspan="2">Internal</th></tr>
<tr><th>Transparency</th><th>Outside-In</th><th>Performance improvement</th><th>Inside-Out</th></tr>
<tr><td>Measurement</td><td>Sustainability assessment (mainly based on reporting needs)</td><td rowspan="2">Measurement & Accounting Systems/Tools</td><td>Sustainability management accounting (mainly based on strategic objectives)</td><td rowspan="2">Accounting & Control Systems/Tools</td></tr>
<tr><td>Management & communication</td><td>Sustainability reporting</td><td>(Progressive) design and use of formal and informal sustainability management control</td></tr>
</table>

On the other hand, the Inside-out perspective has an internal and, most importantly, strategic relevance to sustainability. This approach „*is driven by strategy and commitment to social and environmental issues"* (Corsi & Arru, 2021) and can be seen as a performance improvement-oriented perspective (Maas et al., 2016). In this case, collected data is not only used for reporting but also for sustainability performance and internal improvement (Maas et al., 2016). The Inside-out approach includes accounting ("*instruments using performance indicators*" (Morioka & de Carvalho, 2016)) & Control Systems/Tools to implement or continuously improve sustainable strategies in operational activities. Companies that follow this approach show a high commitment to sustainable values and a corporate responsibility towards society instead of only attributing a formal meaning to sustainability (Corsi & Arru, 2021).

2.3.2.1 Sustainable assessment & measurement for external reporting

According to Maas et al. (2016) sustainability measurement starts with sustainability assessment which is used for reporting reasons in particular and can be seen as the external perspective in contrast to sustainability management accounting for internal purposes. The latter is also referred to as sustainability performance measurement (Morioka & de Carvalho, 2016) hereafter.

Sustainability assessment is essentially a process of providing information based on predefined indicators or objectives that are relevant to certain target groups. Maas et al. (2016) distinguish between-indicators "*that directly relate to reporting standards*" and performance indicators (Morioka & de Carvalho, 2016) which are described later. Such indicators (targeted for external reporting)

usually gather data from past impacts and are therefore not necessarily useful for strategic management decisions which should rather be oriented towards future issues (Maas et al., 2016).

Based on the outside-in approach, the initial step in conducting a performance evaluation is to engage with stakeholders, assess their expectations, and formulate metrics and accounting approaches in regard to this information (Schaltegger & Wagner, 2006). While some researches (Searcy, 2012) claim that *"governments generally provide relatively little guidance on the implementation of sustainability at the corporate level"* and others complain about the complexity of different guidelines confusing firms (Maas et al., 2016), international regulations (e.g. Greenhouse Gas Protocol with the targets for carbon emission reduction) and standards as well as guidelines gaining increasing relevance (Lee & Farzipoor Saen, 2012). According to Antolín-López et al. (2016) the most frequently used instruments or frameworks are the Global Reporting Initiative (GRI), the Kinder, Lydenberg and Domini (KLD) rating and the Dow Jones Sustainability Index (DJSI). The authors also found that the "*instruments differ quantitatively and qualitatively on how they measure CS*".

In general, sustainability reporting has developed significantly over time, since a variety of regulations and initiative emerged that focus not only on financial but also environmental disclosure (Keeble et al., 2003). As a result, a growing number of corporations are publishing their sustainability performance (Maas et al., 2016). Despite 3% of companies registered with the U.S. Securities and Exchange Commission (SEC) disclosing sustainability information in their regulatory reports (SABS, 2017), investors are dissatisfied with the absence of comparable and reliable data (Bernow et al., 2019). As a result, some authors such as Walker & Wan (2012) assume that reporting is used for greenwashing purposes.

In response to the need for information and the current state of corporate sustainability disclosure, numerous organizations provide reporting standards to enhance or standardize sustainability reporting practices (Christensen et al., 2021). The SASB, GRI and the IFRS Foundation therefore published sustainability reporting standards, while other relevant players such as the IIRC (International Integrated Reporting Council), the TCFD (Financial Stability Board's Task Force on Climate-related Financial Disclosures), and the CDSB (Climate Disclosure Standards Board) also provide guidelines and standards according to Christensen et al. (2021). The GRI in advance provided their G4 guideline (GRI, 2014) containing a set of disclosures in particular for organizations in the Electric Utility sector.

For a considerable time, companies had the option to establish reporting standards on a voluntary basis. However, starting with the financial year 2017, companies in Europe were compelled to do so for the first time. This was due to the Non-Financial Reporting Directive (NFRD) of the European Union, which mandates sustainability reporting for "*companies with securities listed on a regulated market*" (ESMA). In order to further comply with the Paris Climate Agreement and the EU Green Deal, the Corporate Sustainability Reporting Directive (CSRD) was enacted in April 2021 as an extension of the NFRD. This Directive requires all companies in the EU that meet two of the following three criteria (> 250 employees, > €40 million net turnover and > 20€ million on the statement of financial position) to report on their sustainability policy and performance, starting with the financial year 2024 (Verheijke & Anema, 2022).

2.3.2.2 Internal performance measurement, management, and internal communication

While the environmental performance measurement with the focus of handling regulations is already discussed in the previous chapter, performance measurement within this chapter is understood as a company's interest to control, avoid, or reduce harmful environmental impacts (Morioka & de Carvalho, 2016). Moreover, the term sustainability management accounting as Maas et al. (2016) refers to in Table 2 can be seen as Measurement Tools and Systems used to improve sustainability performance. While some tools such as metrics and measurement are primarily used at an operational level, Control Tools and Management Systems operate on a more strategic level (Guenther et al., 2016).

In general, the focus of Sustainability Performance (SP) Measurement is to determine critical indicators, sets of indicators in a system, the process of designing and implementing a Sustainability Performance Measurement Systems (SPMS) and eventually the evaluation of the performance (Morioka & de Carvalho, 2016). According to a definition by Tangen (2005), a Performance Measurement System is "*a set of performance measures that provides a company with useful information that helps manage, control, plan, and perform the activities undertaken by the company*". In comparison to conventional performance measurement systems, an SPMS must focus on aspects of sustainability, which is most commonly done by addressing issues using the triple bottom line (Elkington, 1997; Searcy, 2012).

One of the biggest challenges in planning such a system is to correctly assess a firm's current situation and goals. From the very beginning of this process, there are a number of overlooked questions that need to be addressed for a meaningful SPMS (Searcy, 2009). Equally important, however, is the correct selection (Keeble et al., 2003) as well as use (Searcy, 2012) of indicators. Finally, it is also important to evaluate the system of indicators on an ongoing basis and to improve it if necessary (Morioka & de Carvalho, 2016; Searcy, 2012).

When defining performance indicators, according to Morioka & de Carvalho (2016) companies should take into account various aspects, including the indicators' purpose, the unit of analysis (individuals, organization, or a set of organizations) (Orlitzky & Swanson, 2012), and the organizational level (strategic or operational) (Schultze & Trommer, 2012). Moreover, environmental performance indicators must possess both validity and reliability. Validity refers to the extent to which the indicators are closely linked to environmental impacts and provides forward-looking information. Meanwhile, reliability involves the ability of the indicators to be quantifiable, externally verifiable, and directly comparable (Morioka & de Carvalho, 2016).

The selected indicators should be in line with the realities of the company, its values and culture, and not solely with regulations (Keeble et al., 2003). Otherwise, a company is following the Outside-In perspective without any interest to improve their sustainability impact (Corsi & Arru, 2021). It is also important to select appropriate indicators (or a set of indicators) at different levels within an organization. While at the corporate level sustainability performance of the entire organization should be measured, the indicators at the project level should primarily measure whether project activities are aligned with the principles of sustainable development. A difficulty in measuring performance is the complexity of large organizations. If a subsidiary, business line, function or project performs sustainably well or poorly, this can be diluted by general assessments of the entire organization

(Keeble et al., 2003).

Finding the most suitable indicators can be very time-consuming. It is important to consider the development and use of indicators as a "*dynamic process*" (Keeble et al., 2003) rather than a concrete target to be achieved. Above all, selected indicators must be controlled continuously and modified if circumstances and thus the sustainable impact of the organization change (Searcy, 2012). This may occur through the development of a new product, the expansion of a new business area, or through changed stakeholder expectations (Keeble et al., 2003).

Besides sustainability management accounting as shown in Table 2, Maas et al. (2016) refers to a "*(progressive) design and use of formal and informal sustainability management control*" as management and communication approach of an Inside-out perspective.

In general, sustainable performance management is related to management systems that use frameworks such as the European Eco-Management and Audit Scheme (EMAS) or various ISO standards. These practices therefore essentially aim to improve sustainability performance on an ongoing basis (Morioka & de Carvalho, 2016), for example through PDCA cycles as described by Iraldo et al. (2009), in which the four steps *"plan, do, check, act"* are carried out repeatedly. Sustainable performance management systems or environmental management systems therefore operate on a more strategic level and can be seen as a subset of an overall management system (Guenther et al., 2016).

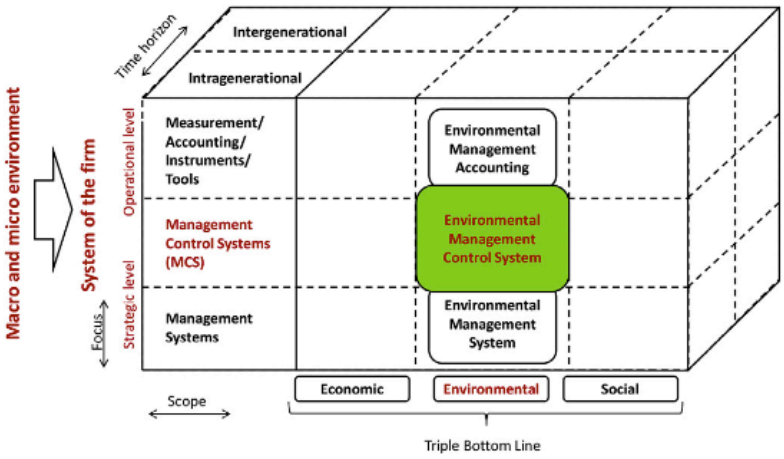
Maas et al. (2016) additionally includes Environmental Management Control Systems or Tools within their categorization of "management and communication" as shown in Table 2. However, this category will not be discussed at this point, but in chapter 2.3.3.2.

2.3.3 Overview and frameworks of Sustainability Management Tools, Control Tools and Systems

The current chapter and its corresponding sub-sections aim to provide more information on frequently referenced frameworks from the literature on this topic as well as another categorization listing concrete tools. Whereas Hörisch et al.'s (2015) classification in chapter 2.3.3.1 is primarily associated with environmental management accounting, the frameworks on management control and environmental management control systems outlined in chapter 2.3.3.2 pertain to a more strategic level.

Figure 2: "Positioning framework" for Environmental Management Control Systems

(Guenther et al., 2016)



2.3.3.1 Categorization of Sustainability Management Tools by Hörisch et al. (2015)

The academic literature has investigated Sustainability Management Tools (SMTs) with varying levels of scrutiny. While certain tools, such as the Sustainability Balanced Scorecard (de Villiers et al., 2016; Figge et al., 2002), have been the subject of several studies, other SMTs have received limited scholarly attention. Due to the broad use of the term "Sustainability Management Tools", Hörisch et al. (2015) have proposed a classification scheme that categorizes SMTs into distinct categories. The fundamental basis for these types of tools rests on the intended purpose of the respective tools, specifically, how they support and assist management. The authors classified SMTs on the premise that incorporating sustainability first obtaining knowledge about the company's current sustainability status, followed by a redesign of services and products and eventually communicating and reporting (Hörisch, Ortas, et al., 2015).

The following categories should provide a comprehensive overview and highlight their principal differences. Subsequently, Table 3 list all types of tools as well as distinct SMTs employed for each category.

The initial classification of SMTs proposed by Hörisch et al. (2015) includes the category of **Sustainability Accounting Tools**. These instruments afford organizations the opportunity to measure and quantify their sustainability performance in an initial phase. The primary function of these tools is to track changes in physical quantities, such as raw materials or energy, through means such as energy flow and material flow accounting. Alternatively, they can track the ecological effects of a product or service throughout its complete life cycle (de Beer & Friend, 2006), from acquisition of raw materials to disposal or recycling, thereby enabling the identification of the root causes of negative environmental impacts (Hörisch, Ortas, et al., 2015; Inghels, 2020).

Indicators are denoted as the second classification of SMTs, serving the primary function of providing managers with vital information that supports their decision-making process. They play a crucial role in contextualizing the data generated by Accounting Tools, thereby enabling the identification of meaningful alternatives or comparison with environmental performances of competitors. As discussed in greater detail in 2.3.2.2, indicators offer a means of identifying

environmentally sustainable initiatives that can yield improved outcomes (Hörisch, Ortas, et al., 2015). In addition to sustainability benchmarking (Krajnc & Glavič, 2005), eco-efficiency or sustainability indicators are examples of SMTs in this category.

An additional classification of SMTs comprises instruments such as **eco-design and sustainable design** (Brouillat & Oltra, 2012), sustainable supply chain management, and the product carbon footprint (Trappey et al., 2012). While SMTs for product design are utilized to reduce the environmental impact during the process of developing new products and services (Charter & Tischner, 2017), tools such as the product carbon footprint serves to quantify the amount of carbon emissions associated with the production of a product. Overall, these types of tools are intended to leverage the insights generated by Accounting Tools and indicators, with the aim of actually improving aspects of their products or services towards a better sustainable impact (Hörisch, Ortas, et al., 2015).

Finally, companies are either obligated or self-motivated to communicate and report their sustainability initiatives. **Communication and Reporting Tools** facilitate the publishing of sustainability reports that inform internal and external stakeholders about the company's performance (Hörisch, Ortas, et al., 2015). In addition, sustainability labels (Franz et al., 2010) are a means of communicating product quality to customers and stakeholders, while repeated stakeholder dialogues (Hörisch, Schaltegger, et al., 2015) can yield ideas for enhancing corporate environmental performance.

Table 3: Overview of SMTs Groups and specific tools adapted from (Hörisch, Ortas, et al., 2015)

SMT groups	Tools
Accounting	Material flow analysis Material flow and energy flow accounting Material flow cost accounting Eco-balance/life-cycle assessment
Sustainability indicators	Eco-indicators Eco-efficiency indicators Sustainability indicators Sustainability benchmarking
Product design	Eco-design/design for environment Sustainable design Product carbon footprint Sustainable supply chain management
Communication	Stakeholder dialogue

	Environmental report Sustainability report Sustainability label

2.3.3.2 Frameworks for Management Control Systems (MCS) and Environmental Management Control Systems

While Management Control Tools or Systems in general, are used for the communication of objectives, monitoring of performance, motivation to achieve goals (Wijethilake et al., 2017) and other management activities to "*direct employee behavior*" (Malmi & Brown, 2008), sustainability management control are further aligned with the TBL as shown in

Figure **2**. Thus, SMCTs can be defined as a "*set of tools and practices useful to operationalize sustainable strategies and to ensure a balanced achievement of the economic and social and environmental corporate performance*" (Vitale et al., 2019, p. 4).

According to Guenther et al. (2016) the most frequently used frameworks within empirical studies on MCS are Simons' (1994) LoC framework and Merchant and Van der Stede's (2011) Object of Control (OoC) framework.

The LoC frameworks consists of four levers of control. Two of these levers, namely the interactive systems, such as the discussion of strategic changes and communication in general, as well as the diagnostic systems, for instance the monitoring of performance variables, emphasis the application of formal management controls. Meanwhile, the boundary system, for instance avoidable risks, and the belief system, such as basic values and norms of an organization, are used for designing a MCS (Guenther et al., 2016).

Merchant and Van der Stede (2011), on the other hand, propose their OoC framework that distinguishes between results, action, cultural and personal controls. Results controls emphasize the outcomes of employee behavior and action controls are for instance used for monitoring processes.

More informal controls are cultural controls, like organizational culture and incentive systems, and personal controls including for instance employee selection and training (Guenther et al., 2016).

A more comprehensive framework is the also frequently applied framework by Malmi and Brown (2008), which goes beyond the classical approach focusing on financial cybernetic controls (Guenther et al., 2016). Malmi and Brown (2008) argue that MCSs play a significant role in the alignment of organizational goals with actions, communication and coordination, as well as managing interdependencies. The authors emphasize the importance of considering both the design and use of MCS and to consider not only technical aspects but also the social and cultural context in which the system operates. As shown in Table **4**, Malmi and Brown's (2008) MCS Package consist of five types of controls. The consideration of the "package" approach which comprises diverse controls as one package is legitimised as it "*ensures a comprehensive understanding of SD enforcement in practice*" (Lueg & Radlach, 2016). Moreover, this approach "*addresses the criticized gap between the extant management control literature and practice*" (Guenther et al., 2016)

Table 4: Management Control Systems Package adapted from Malmi and Brown (2008, p.291)

<table>
<tr><td colspan="8">Cultural Controls</td></tr>
<tr><td colspan="2">Clans</td><td colspan="2">Values</td><td colspan="3">Symbols</td></tr>
<tr><td colspan="2">Planning</td><td colspan="4">Cybernetic Controls</td><td rowspan="2">Reward and Compensation</td></tr>
<tr><td>Long range planning</td><td>Action planning</td><td>Budgets</td><td>Financial Measurement Systems</td><td>Non Financial Measurement Systems</td><td>Hybrid Measurement Systems</td></tr>
<tr><td colspan="8">Administrative Controls</td></tr>
<tr><td colspan="2">Governance Structure</td><td colspan="3">Organization Structure</td><td colspan="2">Policies and Procedures</td></tr>
</table>

As shown in Table 4, Malmi and Brown's (2008) differentiate between cultural, planning, cybernetic controls , reward and compensation as well as Administrative controls. Cultural controls are used to guide behavior through values and beliefs, symbols and clans (Guenther et al., 2016). Planning controls can be distinguished between action planning (for the immediate future) and long-range planning which is relevant on a strategic level. Cybernetic controls include Budgets, Financial, Non-Financial and Hybrid Measurement Systems (e.g., Balanced Scorecard). Most important characteristics are the measurement and quantification of activities or a system as well as performance or targets to be achieved (Malmi & Brown, 2008). Another type of controls are rewards and compensation which according to Epstein & Buhovac (2014) "*can be a critical tool to implement sustainability and align the interests of the corporation, senior managers, and all employees".* Finally, administrative controls are used to direct employee behavior through organizational and governance structure as well as policies and procedures (Malmi & Brown, 2008).

While the overall goal of the aforementioned management control systems was primarily focused on financial or economic performance, first studies linked these traditional MCS with sustainability aspects (Guenther et al., 2016). Gond et al. (2012), for example, building on Simons' (1994) LoC framework, tries to analyze "*the role and use of MCS and sustainability control systems in the integration of sustainability within organizational strategy*". After conducting their study, the authors supposed that environmental issues can be adopted by MCS. Hence, Guenther et al. (2016) summarizes the most important aspects of EMCS as follows: They "*may facilitate an effective integration of environmental issues within the processes of strategy-making and strategy implementation, align corporate decision-making and employee behaviors and actions with environmental objectives, and improve the identification of emerging threats and opportunities*".

2.4 Success factors

Success factors are critical elements that contribute to the success of a business or project. Rockart (1979) defines critical success factors (CSFs) as "*the limited number of areas in which satisfactory results […] will ensure successful competitive performance for the individual, department, or organization*". Bullen and Rockart (1981) further elaborate on CSFs as the "*few key areas where "things must go right" for the business to flourish."*

Leidecker (1984) identifies four characteristics of critical success factors. First, they are limited in number, meaning that there are only a few critical areas that determine success. Second, CSF are measurable, as they need to be evaluated for the effectiveness of the strategy. Third, they are controllable, as they can be influenced by the company. Finally, they are critical, meaning that succeeding in these factors is essential to the company's success.

In addition to these characteristics, Hofer and Schendel (1978) suggest that success factors are specific to the industry and the competitive environment in which the company operates. They argue that a firm's strategy should be based on the identification and exploitation of its unique success factors in the respective marketplace. This argument is also supported by Porter (1980) who emphasizes the importance of understanding the competitive forces that shape the industry in order to develop a successful strategy. Since CSFs should be specific to an industry and its competitive environment, they can be influenced by various factors, such as changes in market conditions, technological development, and customer preferences. As a result, success factors are usually not stable and change over time (Rockart, 1979).

According to Bullen and Rockart (1981) the concept of CSFs can be applied to four different hierarchical levels, namely industry, corporate, sub-organization, and individual level. While success factors at industry level affects every single organization's strategy and goals within the industry, at the corporate level CSFs are used internally to guide a company's overall strategy (Hofer & Schendel, 1978). Sub-organizational level is a further hierarchical structure of a company, e.g. function or division, in which individual success factors can be identified based on their own environment. Finally, CSFs at an individual level are dependent on managers and most importantly on their specific role and temporal factors (Bullen & Rockart, 1981).

2.5 The energy industry & incumbent energy provider

2.5.1 Definition

The energy sector can be defined as a segment of the economy that includes all industries involved in producing, transforming, and distributing energy, such as oil, gas, coal, and renewable energy. The Global Industry Classification Standard (MSCI, 2023) further specifies that the Energy Sector comprises companies that are engaged in the exploration and production, refining and marketing, as well as storage and transportation of energy. According to Chen (2022) the Energy Sector primarily includes businesses producing or supplying energy and has been one of the most important drivers "*of industrial growth over the past century, providing fuel to power the rest of the economy*". Since power companies also function as transmitter and distributer for delivering energy to businesses and individuals, these firms are sometimes classified as part of a distinct utility sector, especially if they

are subjected to strict regulation (Maverick, 2022).

2.5.2 Industry overview

The global and European energy sectors have experienced significant changes in recent years. While the COVID-19 pandemic caused a decline in global energy consumption in 2020, the market has recovered strongly in 2021 and is expected to continue growing. In 2021 the market volume of the European energy consumption sector grew by 3.3%, while the energy consumption grew by 19.5% in 2021 to reach a total value of $1,708.4 billion (MarketLine, 2022a, 2022b).

Since the COVID-19 pandemic, the "*European power markets have entered a period of unprecedented change*" (McKinsey, 2021). The rise in power prices to unprecedented levels has had a massive impact on the cost of electricity produced by natural-gas power plants, which typically set prices in European markets. In addition, the market has experienced increased price volatility due to the uncertain output of renewable assets and the tight balance between supply and demand in the European power system. The emergence of these conditions has created a set of challenges, utilities, traders, as well as large power consumers have to face now (McKinsey, 2021).

Typically, the energy market is recognized as one of the most capital-intensive sectors, demanding massive investments in infrastructure for energy production and transportation (Maverick, 2022). Consequently, energy firms must contend with larger capital expenditures than most other industries, presenting a significant portion of fixed assets, such as property, plant, and equipment (PP&E). Due to the high proportion of fixed costs compared to variable costs, entry barriers are considerably high, thereby promoting competition among larger incumbent firms (Frankenfield, 2020).

Nevertheless, the level of rivalry in the European energy consumption industry can vary depending on the region and supply chain segment. In many European countries, a liberalized energy sector and strong incumbents result in a highly competitive environment. The transition from fossil fuels to renewable energy, technological advancements, and liberalization continue to promote competitive trends. The COVID-19 pandemic has intensified competition as it significantly decreased energy demand at first (Frankenfield, 2020; Maverick, 2022).

Due to the Paris Agreement, governments also started to set carbon emissions reduction targets, causing the industry to experience new challenges. In the MarketLine (2022a) sector analysis for the European Energy Consumption, the required response for leading incumbent companies is to "*adjust their strategies to transition from being leading companies in existing markets, to leaders of growth in emerging markets*". Competition will therefore shift primarily to growth in emerging markets related to renewable energies.

3 METHOD

In the previous chapter 2 Conceptual background, a research gap was identified, which will be investigated by means of empirical research. First, the selected research design is described. This is followed by a chapter on the origin and identification of data for each of the following categories: scientific literature, grey literature, and expert interviews.

3.1 Research Design

To address the research questions of this Master's thesis effectively, the empirical part of this study employs a qualitative research method. Qualitative research is characterized as "*an inquiry process*" (Creswell, 1994) consisting of "*identifying, coding and categorizing*" (Joubish et al., 2011) collected data.

One of many approaches to qualitative research is the grounded theory method. According to Urquhart et al. (2010) , it aims to "*develop a theory based on systematically collected and analyzed data*". The method represents inductive research that allows theoretical approaches to be developed and simultaneously examined with empirical data. In comparison to traditional qualitive research, the grounded theory approach is an iterative process of continuously collecting and analyzing data that eventually tries to form a bridge between theory and practice (Urquhart et al., 2010). Instead of testing well-established theories or objectives, the research design rather tries to inform new theories (Creswell, 2014) which makes it a reasonable choice for the previously identified research gap. Using this methodology, three different types of data are continuously collected and analyzed and subsequently synthesized.

3.2 Data sources

The following sub-chapters represent different types of qualitative data. The methodology described above is carried out with scientific literature, grey literature, and expert interviews.

3.2.1 Scientific literature

To begin with, data on scientific literature was collected by conducting a systematic literature review. According to Tranfield et al. (2003, p. 209), a systematic literature review is defined as "*a replicable, scientific and transparent process […] that aims to minimize bias through exhaustive literature searches of published and unpublished studies*".

Contrary to traditional or unsystematic reviews, the objective is to systematically collect existing data and to filter and evaluate it based on predefined criteria instead of the researcher's subjective selection (Linnenluecke et al., 2019). For this systematic approach to be transparent, criteria regarding quality and relevance for the research area is established in advance (Denyer & Tranfield, 2009). Ultimately, this systematic approach aims to identify a small number of studies relevant to the research area, derived from a large number of publications (Linnenluecke et al., 2019).

The method was chosen to systematically explore existing literature on the research topic of this Master thesis. Due to the definition of criteria in advance, this research should bring more reliable results than other methods.

To ensure a rigorous and systematic approach in identifying relevant scientific literature, the present study employed a set of predefined search terms relevant to the research questions. These terms were combined using the Boolean logic to maximize the coverage and accuracy of the search results.

The selected search terms for the systematic literature review for scientific literature is presented in Table 5.

Table 5: List of search terms for the systematic review of scientific literature (own depiction)

Nr.	Search terms
S1	Sustainab* OR Environmental
S2	Corporate OR Business OR Management OR Strateg*
S3	Management Tool OR Performance Measurement OR Measurement Tool OR Accounting Tool
S4	Tool OR Measurement OR Assessment OR indicators OR indices OR System OR Control
S5	Utilit* OR Energy Utilit* OR Energy Industry OR Energy Company OR Energy Provider
S6	Successful OR Critical Success factor OR Key Success factor OR Success factor

The literature review was conducted through the internationally renowned database EBSCO. After an initial search query using the selected key words, the following criteria were defined to ensure quality and relevance to the research questions. First, only publications written in English and with the search terms used in their title met the initial criteria. Also, exclusively papers published by peer-reviewed journals and those that are ranked equal to or higher than "B" according to the guidelines of the Department Strategy & Innovation of the Vienna University of Economics and Business Administration are considered high-quality journals for this paper. Moreover, the publications were filtered based on their date of publication, and only those published since the year 2000 were deemed relevant. This was justified based on the current relevance of the research area, as previous papers were considered inadequate to reflect the current state of research. Finally, after applying all criteria, the long list of results was screened for relevance regarding the research questions.

Table 6: Results of the systematic review of the scientific literature (own depiction)

Combination of search terms	Initial count of results	Met quality criteria	Met relevance criteria	Number in Table 7
S1 ANS S2 AND S3	343	225	16	1-16
S1 AND S4 AND S5	100	43	4	17-20
S1 AND S4 AND S6	37	23	3	21-23

Table 6 shows the number of results according to the cutting down process for each combination of search terms. After filtering and screening in regard to quality and relevance, a total number of 23

articles relevant to the research questions could be derived from three search queries. An overview of those scientific papers is shown in Table 7. In addition, two articles that were found relevant based on the references of the empirical data were also included for reasons of coherence.

At this point, it should be mentioned that not all articles turned out to be relevant in the course of writing the following chapters, resulting in not including some of them.

Table 7: Overview of articles retrived (own depiction)

Nr.	Author	Year	Title
1	Alonso-Paulí, E., André, F. J.	2015	Standardized environmental management systems as an internal management tool
2	de Beer, P., Friend, F.	2006	Environmental accounting: A management tool for enhancing corporate environmental and economic performance
3	Essid, M., Berland, N.	2018	Adoption of environmental management tools: the dynamic capabilities contributions
4	Hoque, Z.	2004	A contingency model of the association between strategy, environmental uncertainty and performance measurement: impact on organizational performance
5	Hörisch, J., Ortas, E., Schaltegger, S., Ãlvarez, I.	2015	Environmental effects of Sustainability Management Tools: An empirical analysis of large companies
6	Kocmanová, A., Simberova, I.	2014	Determination of environmental, social and corporate governance indicators: framework in the measurement of sustainable performance
7	Küçükbay, F., Surucu-Balci, E.	2019	Corporate sustainability performance measurement based on a new multicriteria sorting method
8	Maas, K., Crutzen, N., Schaltegger, S	2014	Integrating corporate sustainability performance measurement, management control and reporting
9	Merlin, F., Pereira, V., Júnior, W.	2012	Sustainable development induction in organizations: a convergence analysis of ISO standards management tools' parameters
10	Perego, P.,	2009	Aligning Performance Measurement Systems with

	Hartmann, F.		Strategy: The Case of Environmental Strategy
11	Pryshlakivsky, J., Searcy, C.	2017	A Heuristic Model for Establishing Trade-Offs in Corporate Sustainability Performance Measurement Systems
12	Ridgway, B.	2005	Environmental management system provides tools for delivering on environmental impact assessment commitments
13	Schaltegger, S., Windolph, S., Herzig, C.	2012	APPLYING THE KNOWN: A longitudinal analysis of the knowledge and application of Sustainability Management Tools in large German companies
14	Searcy, C.	2012	Corporate Sustainability Performance Measurement Systems: A Review and Research Agenda
15	Talbot, D., Raineri, N., Daou, A.	2021	Implementation of Sustainability Management Tools: The contribution of awareness, external pressures, and stakeholder consultation
16	Testa, F., Iraldo, F., Daddi, T.	2018	The Effectiveness of EMAS as a Management Tool: A Key Role for the Internalization of Environmental Practices
17	Block, C., Van Gerven, T., Vandecasteele, C.	2007	Industry and energy sectors in Flanders: environmental performance and response indicators
18	Searcy, C., Karapetrovic, S., McCartney, D.	2005	Designing sustainable development indicators: analysis for a case utility
19	Searcy, C., McCartney, D., Karapetrovic, S.	2007	Sustainable development indicators for the transmission system of an electric utility
20	Stasiškienė, Ž., Šliogerienė, J.	2009	Sustainability assessment for corporate management of energy production and supply companies for Lithuania
21	Gibson, K.	2005	Environmental Management Systems: How Successful Are They?
22	Runhaar, H., Driessen, P.	2007	What makes strategic environmental assessment successful environmental assessment? The role of

			context in the contribution of SEA to decision-making
23	Walling, E., Vaneeckhaute, C.	2020	Developing successful environmental decision support systems: Challenges and best practices
Additional Papers			
24	Talbot, D., Boiral, O.	2015	GHG Reporting and Impression Management: An Assessment of Sustainability Reports from the Energy Sector
25	Searcy, C., McCartney, D. Karapetrovic, S.,	2006	Sustainable development indicators for the transmission system of an electric utility

3.2.2 Grey literature

In addition, this thesis incorporates grey literature as a valuable source of information. Grey literature refers to knowledge artifacts that do not undergo the conventional literature review typically associated with scientific journal publications (Lawrence et al., 2014). This may include, amongst others, book chapters, publications by industry experts (e.g. leading consultancy firms), policy documents or publications by government agencies (Adams et al., 2017).

As in Chapter 3.2.1, the Grey literature was also systematically reviewed. Again, predefined criteria were selected for the literature review process. Besides the selection of criteria regarding quality, the origin of the sources and the date of publication were also considered as relevant.

The **quality and reliability** of Grey literature can vary significantly (Adams et al., 2017). To address this, only specific types of grey literature, perceived to possess higher quality, were included. In addition, the fit of each source to the research focus of this thesis was assessed, leading to the following types of Grey literature considered relevant.

- **Book chapters**: Books or book chapters usually provide more detailed descriptions. In the context of this Master's thesis they provide more in-depth information, for instance, on specific Sustainability Management Tools.
- **Publications from governmental agencies:** As companies are increasingly faced with sustainability requirements (e.g., NFRD/CSRD) or recommendations, this type of source represents a relevant starting point or target for Sustainability Management Tools.
- **Blogs:** Blogs were considered relevant as they can usually provide a high degree of actuality and have a higher practical relevance than other sources.
- **Publications from industry experts** (e.g., consulting forms): These usually have a high degree of actuality and practical relevance as well. In this thesis, consulting reports for the energy industry or for the field of sustainability are considered suitable.

In addition to the quality of the grey literature, the **geographical origin of the source** was also defined as a criterion. In principle, no strict geographical restrictions were applied here, however,

due to obligatory reporting standards (e.g., NFRD/CSRD), a focus on Europe and, as a comparison, the USA was meaningful.

The third selection criterion was the **date of publication**. Accordingly, as in Chapter 3.2.1, only sources from the year 2000 onwards were selected to ensure the current relevance of the topic.

Due to the fact that grey literature cannot be searched through an academic database, this process was conducted through the search engine Google. Again, connectors such as AND / OR were used whenever applicable. A total of 8 search queries were conducted as shown in Table 8. The first results were then reviewed and selected based on the predefined criteria.

Table 8: List of search terms for the systematic review of grey literature (own depiction)

Nr.	Search Term
S1	Sustainability Management Tools in the Energy Industry
S2	Sustainability Measurement Tools in the Energy Industry
S3	Sustainability Accounting Tools in the Energy Industry
S4	Environmental Performance Measurement
S5	Environmental Performance Management
S6	Sustainability Management Control Tools
S7	Advantages and disadvantages of Sustainability Measurement Tools
S9	Success factors of Sustainability Measurement Tools in the Energy Industry

This paper follows the guidelines for an appropriate approach to searching and selecting grey literature according to Adams et al. (2017). Using this type of literature in addition to a scientific literature review and expert interviews not only contributes positively to the quality of a paper (Adams et al., 2017), it is even argued that not using it leads to poorer recommendations (Levy & Williams, 2004). Grey literature is not only an excellent support for scientific literature as "*supplementary and complementary evidence*" (Adams et al., 2017), it also has the ability to outpace white literature by providing the most recent information. In combination with the other two types of empirical research, grey Literature therefore make a valuable contribution to this Master thesis.

3.2.3 Semi-structured expert interviews

To complete this Master thesis knowledge base with another type of empirical research, expert interviews were conducted and subsequently integrated into Chapter 4 Findings.

In general, qualitative interviews do not have a comparable reliability and generality as, for example, quantitative research methods (Jäger & Reinecke, 2009). It is therefore important to note that interviews can never give a reliable claim to an objective statement. The information gained from the interviews reflects the subjective opinion of the interviewees and the subjective perception of the interviewer. Even if the interviewer tries to minimize this bias, all statements based on interviews

within this thesis are influenced by the author's subjective interpretation (Cassell, 2009). However, if conducted appropriately, interviews can provide meaningful and precise insights into interviewee's opinions that could not be provided by literature (Creswell, 2014). To increase the validity of this method and to reduce the influence of potentially misleading interview contributions, it is necessary to collect a sufficient amount of data (Charmaz & Belgrave, 2012).

Interview contacts:

The experts for this thesis were again chosen using a systematic approach. A distinction was made between two types of experts, namely sustainability managers and consultants. Both had to meet the following five predefined criteria.

First, it was necessary that the **current position** is related to sustainability issues. Otherwise, it could not be guaranteed that a person has sufficient insights into Sustainability Tools used in an organization (energy provider) or expertise in them (Consultancy).

Secondly, the Energy **industry** is a given criterion. A potential interviewee either works in the energy industry (Sustainability Manager) or ideally has expertise in this sector (Consultant).

In addition, to ensure the quality of the data to be collected, the **background** of an interviewee is relevant. Ideally, this person should have great expertise and a strong record on the subject.

Another essential criterion was the **degree of implementation of Sustainability Management Tools** (only for energy companies). Since the aim of this thesis is to identify advantages and disadvantages as well as success factors of these tools, it is necessary that at least some of these tools are already implemented to share valuable experiences and information.

Finally, experts were selected based on their **company's country of residence**. Since the EU has established standardized guidelines for sustainability reporting (e.g., NFRD, CSRD), this selection criterion was limited to countries in Europe.

Adequate interview contacts were searched for through networks such as LinkedIn, personal contacts, and company websites. To proceed as systematically as possible in this process, experts were sought on the basis of the following search terms for the role of the persons ("head of sustainability", "sustainability manager", "sustainability consultant" or "consultant energy industry"), for instance via LinkedIn.

Ultimately, 11 semi-structured interviews were conducted with the use of an interview guide, which can be found in the Appendix of this Master thesis. All of them were conducted online via MS Teams.

Table 9: List of Interview partners (own depiction)

Nr.	Current position	Type of employer	Country of Residence
1	Head of Sustainability	Energy Provider	Austria
2	Partner	Consultancy	Switzerland
3	Associate Manager	Consultancy	Austria

4	Manager - Advanced Analytics & ESG	Consultancy	Germany
5	Sustainability Manager	Energy Provider	Germany
6	Social Sustainability Manager	Energy Provider	United Kingdom
7	Sustainability Manager	Energy Provider	Germany
8	Director, Territory Leader Energy, Utility & Resources	Consultancy	Austria
9	Chief Executive Officer	Energy Provider	Austria
10	Head of CSR	Energy Provider	France
11	Sustainability Manager	Energy Provider	Austria

3.3 Data analysis

As outlined before, this Master thesis adheres to the methodology of grounded theory. According to Egan (2002), this is an iterative process consisting of several steps. Within the data analysis period, data collection is still ongoing, and the research direction will undergo constant adjustments until the topic is saturated (Charmaz & Belgrave, 2012; Egan, 2002).

After an initial coding of the first set of data, codes are continuously applied, compared, and revised. At this stage new categories may emerge, leading to the formation of category sets. Those are then applied and modified in the next step as well as elaborated depending on the clarity. The process is concluded by detailing the conceptual grounding and explaining the analytical rationale for the research process (Egan, 2002).

For this Master thesis, data from different types of sources were collected. Frist, a scientific literature review was carried out (see chapter 3.2.1), followed by a grey literature review (see chapter 3.2.2).

Meanwhile, the interviews with 11 experts have been conducted. Those were in the next step transcribed using the software F4 and subsequently analyzed via MAXQDA.

The qualitative data analysis for all three types of data followed the guidelines of Kuckartz and Rädiker (2022). The coding system was first formed inductively, emerging from analyzing the most relevant statements of all three data sources, and continuously adapted whilst this process.

In the end, all data sources and their respective analyses were synthetized in Chapter 4 to finally answer the research questions (Charmaz & Belgrave, 2012). Table 10 provides an overview of the resulting sub-chapters on the respective research questions.

Table 10: Overview of chapters on findings (own depiction)

Chapter Nr.	**Chapter title**
RQ1: What are Sustainability Management Tools used by incumbent energy providers?	
4.1	Overview of Sustainability Management Tools

4.1.1	General Aspects
4.1.2	Sustainability Reporting Tools
4.1.3	Sustainability Assessment Tools
4.1.4	Sustainability Management Control Tools
RQ2: What are success factors of Sustainability Management Tools at different levels of incumbent energy provers?	
4.2	Success factors for Sustainability Management Tools
4.2.1	Success factors at corporate level
4.2.2	Success factors at interorganizational level
4.2.3	Success factors at individual level

4 FINDINGS

This chapter focuses on the outcomes derived from the three empirical data sources expounded earlier. It will be organized in accordance with the two research questions posed in this study. Chapter 4.1 addresses the initial research question, examining the merits and drawbacks of Sustainability Management Tools. In contrast, chapter 4.2 presents success factors contributing at various organizational levels, thereby answering the second research question.

4.1 Overview of Sustainability Management Tools

The following chapter is intended to answer RQ1: *What are Sustainability Management Tools used by incumbent energy providers?* After an introductory exploration of the basic facets of SMTs, including an examination of the differences in definitions and classifications in both the practical and academic realms, the following subchapters present an overview of concrete SMTs, providing detailed descriptions and a comprehensive analysis of their respective advantages and disadvantages.

4.1.1 General Aspects

4.1.1.1 Definition

In the literature, the concept of Sustainability Management Tools encompasses a wide range of approaches and resources. A common definition in scientific literature is described as "*management methods that specifically serve the purpose of implementing corporate sustainability"* by Hörisch et al. (2015). Meanwhile, a more recent understanding from grey literature (Schönherr et al., 2019) states that these tools can vary "*from simple guidelines and checklists, to fully-fledged analytic software applications, to specific procedural requirements that companies can implement, frequently in collaboration with their stakeholders*".

These descriptions are in line with the assertion of practitioners as, for example, interviewee 6 stated that "*essentially, a tool is something that helps you do something related to sustainability*" and interviewee 5 described that "*sustainability management is typically obtained through the aggregation of key performance indicators and textual documentation which is often achieved through the use of several separate tools or an integrated systems that facilitate the comprehensive management of sustainability-related data and reporting*".

4.1.1.2 Recent development of tools

In recent years, many organizations have adopted and developed Sustainability Management Tools to support their efforts to integrate sustainable practices (Schönherr et al., 2019). However, the field of Sustainability Management Tools is still young and that's why dynamic, with new tools emerging all the time (interviewee 1, 3, 6, 7, 8, 11). Besides several startups and consultancies currently working on the development of new software solutions in this area (Interview 3, 4, 8), Interviewee 11 also mentions the ongoing development in research in this area, where practice usually follows suit. Interviewee 8 puts it in a nutshell regarding the topicality of the subject: "*I think it has already arrived in the industry in general, but there is still a long way to go. Companies are just now starting to deal with the subject in the last six to eight months*".

4.1.1.3 Challenging task of selecting tools

However, this abundance of tools has made it difficult for managers to select the most appropriate ones, especially when they are not mandatory or part of pre-defined standards with specified indicators and tools. Managers find it difficult to obtain comparable information on different tools and to determine whether a particular tool meets their company's assessment needs. In addition, there are significant differences between tools in terms of cost, implementation time and data requirements. These variations add complexity to the decision-making process for managers who need to assess the suitability of a tool for their organization (Schönherr et al., 2019).

This challenge in selecting the right tools was also reflected in the findings of the interviews. While the very large, globally active energy companies (interview 1, 5, 6, 7, 10) are partly dissatisfied with their existing tools and are therefore looking for alternative solutions or planning public tenders for new ones, the more regionally active companies (interview 9, 11) mentioned which factors they currently pay attention to when selecting a Sustainability Management Tool. The most relevant factor thereby is the need for tools that are either legally required or adopted by industry leaders, both nationally and internationally. Interview 1 highlights the importance of seeking certainty and confidence in the practicality and relevance of these tools, particularly in the context of the energy sector.

4.1.1.4 Categorization

Table 12 presents a comprehensive list of the most important Sustainability Management Tools according to the results of three data sources. Initially, these individual tools were to be presented as subcategories of the framework by Maas et al. (2016) as shown and described in chapter 2.3.2. However, the findings of the expert interviews indicated that there were too many overlaps so that categories were combined and supplemented. Sustainability measurement usually forms the basis for either sustainability reporting or management control through the initial collection of data (sustainability assessment) and its contextualization, e.g. as an indicator (sustainability accounting).

Insights from the interviews provide a comparison between theoretical understanding and practical application which eventually led to the adjustment of some categories and subchapters. Sustainability measurement was therefore removed as a category since according to several experts (Interviewee 1, 4, 5, 6, 7) there are no separate tools for sustainability measurement in practice. However, "*Measure to report*" or "*Measure for control*" (Interviewee 4) are buzzwords that were frequently used by practitioners to demonstrate its relevance towards these two categories.

In addition, Interview 4 summarizes these two main reasons to measure sustainability data as follows: "*On the one hand, how do I influence a movement towards sustainability within my company? And on the other hand, how do I report on the current state, successes, or failures?*"

At the heart of these two perspectives is sustainability measurement, which includes both the assessment and accounting of sustainability data. Interviewee 1 emphasizes the fundamental role of accounting, stating that "*for me, accounting is the basis for reporting*". Furthermore, interviewee 2 emphasizes the importance of monitoring sustainability data as a fundamental element of strategic management decisions, thus confirming the assertion in the literature that "*you cannot manage what you do not measure*" (Cooper & Edgett, 2008).

Nevertheless, it was found that the distinction between tools for reporting and management control is not always clear-cut. For instance, some instruments are used to obtain information that is subsequently published in sustainability reporting, but at the same time are also used for strategic management control. This category also includes niche tools, as described by Interviewee 4, which are "*used for a very specific analysis for a specific topic, which is usually a sub-topic in regulation, and is then selected by management as a topic worthy of improvement, in order to actively improve the key figure, the result*". In this study, these tools have been categorized under "Sustainability Assessment Tools" as presented in Table 11 & Table 12. This classification primarily includes tools designed to collect and measure sustainability data for subsequent strategic use. However, some of these tools are mandated by legal requirements (e.g., CSRD) and are carried out as part of the reporting process. Concrete examples are given in subchapter 4.1.3. Meanwhile the category of Sustainability Reporting Tools only focuses on reporting frameworks, which take into account various voluntary as well as mandatory regulations and their advantages and disadvantages. Accordingly, the category "Sustainability Management Control Tools" discusses those tools that focus on internal performance improvement and do not generally provide information that is published in the sustainability report.

As illustrated in Table 11, Sustainability Reporting Tools and frameworks operate primarily at an operational level and are used regularly (at least annually). In contrast, Sustainability Management Control Tools, characterized by their forward-looking nature and longer-term perspective, occupy a predominantly strategic domain. Sustainability Assessment Tools are typically based on historical or current data, but fundamentally support high-level management decisions. Consequently, these tools cover both operational and strategic levels.

Table 11: Categorization of Sustainability Management Tools

Categorization	Definition	Management level
Sustainability Reporting Tools	Methods to disclose and communicate sustainability issues	Operative
Sustainability Assessment Tools	(Analytical) techniques to present sustainability data in a way that supports decision making	Operative-strategic
Sustainability Management Control Tools	Tools to "*operationalize sustainable strategies and to ensure a balanced achievement of the economic and social and environmental corporate performance*" (Vitale et al., 2019)	Strategic

Justifying the categorization for this Master thesis requires acknowledging that it is generally a challenging task within the respective field of research. According to Schönherr et al. (2019b), there have been several attempts to develop meaningful classifications that enable systematic comparisons. However, due to the ongoing development and emergence of new tools, this task remains exceedingly difficult.

In accordance with the above categorization, all the tools relevant to this Master's thesis are listed in Table 12 and discussed in more detail in the following subchapters.

Table 12: Sustainability Management Tools (comprehensive list)

Sustainability Management Tools (comprehensive list)				
Sustainability Reporting Tools				
GRI	- Most commonly used - Comparability	- Information can be omitted - Probably less important in the future (due to the CSRD)	- Widely used international voluntary standard for sustainability reporting	- Data on a huge range of social performance (e.g. child labor, health and safety), or environmental (e.g. biodiversity, water, CO^2 emissions)
GHG Protocol & Scope 1, 2, 3	- Most commonly used - Internationally recognized - Precise regulations - GRI & ESRS refer to it	- Challenging (especially Scope 3) - Contents can be omitted	- Substandard for determining CO2 emissions along the value chain of an organization - While Scope 1 measures the direct GHG emissions and Scope 2 the indirect GHG emissions, Scope 3 determines additional indirect emissions along the entire life-cycle of a product or service	- Activity data, emission factors and GWP potential values from own organization, suppliers and other partners along the value chain
CSRD	- Comparability of organizations and increased transparency - Hinders greenwashing by not allowing to publish any other information than suggested by renowned standards or laws - Not allowing to omit information	- Enormous scope of information to be reported - Only little time until the law comes into force	- EU law and mandatory framework for sustainability reporting (from 2025)	- Data on a huge range of social performance (e.g. child labor, health and safety), or environmental (e.g. biodiversity, water, CO^2 emissions)
Sustainability Assessment Tools				
Materiality Assessment	- Good for prioritizing sustainability issues - No complex,	- Application can vary	- Tool to identify the most material sustainability issues of an organization in line with	- Key issues for management and stakeholders

	expensive tool necessary - Results provide ideal basis for strategic decisions - Comparison of external perception / self-perception through stakeholder engagement - Driver for innovation		stakeholder requirements	
GAP-Analysis	- Assessment of current status and identification of missing data	- Lack of consideration of the market or the competition	- Management Tool to identify the current status (with regard to sustainability aspects) and to compare it with strategic goals	- Information on the current state of an sustainability issue and its desired state
Risk Assessment	- Awareness of the most important risks and factors - Risk screening along the supply chain	- Detailed information required that takes a long time to obtain - Focus is often on sustainability in the context of production costs	- Process to identify, analyze and manage the (potential) sustainability risks of an organization	- Current and historical data (e.g. from media reports) -
Lifecyle Assessment	- Results can be used for other products or development of new ones	- Time-consuming - Complex - High costs	- Systematic analysis to determine the environmental impact along the entire value chain of a manufactured product or service	- Energy use of manufacturing and waste procedures and data on used raw materials
Sustainability Control Tools				
Scenario Analysis	- Integration of sustainability at group level - Possibility of adjustments through ongoing monitoring	- Time consuming - Incorrect assumptions can lead to unrealistic results	- Strategic forecast model to analyze developments in the future	- Qualitative data (e.g. industry trends) and (historical) quantitative data (e.g. CO2 emissions or their costs)
Benchmarking	- Stimulates competition	- External data needs to be purchased	- Method to perform comparative analyses on the basis of reference values	- Data from competition of industry (e.g. CO2 emissions, water consumption, waste

				generation)
Incentives	- Can motivate employees	- Hardly used in practice yet	- Incentives designed to encourage heightened motivation in individuals	- Metrics and goals which are to be achieved e.g., by a (sustainability) manager
Sustainability Balanced Scorecard	- Integration in traditional BSc	- Hardly used or known in practice yet	- Extension of the classic Balanced Scorecard to include one or more sustainability aspects	- Sustainability performance indicators such as e.g. CO2 emissions, water consumption, waste generation

4.1.2 Sustainability Reporting Tools

The following chapter examines various Sustainability Reporting Tools and Frameworks, as shown in Table 13, that are applied to disclose and communicate sustainability issues. As indicated above, it is appropriate to categorize these tools primarily as operational instruments, given their requirement for periodic execution, at least on an annual basis.

Table 13: Advantages and disadvantages of Sustainability Reporting Frameworks

Sustainability Reporting Tools	Advantage	Disadvantage	Definition & key aspects	Required data
GRI	- Most commonly used - Comparability	- Information can be omitted - Probably less important in the future (due to the CSRD)	- Widely used international voluntary standard for sustainability reporting	- Data on a huge range of social performance (e.g. child labor, health and safety), or environmental (e.g. biodiversity, water, CO2 emissions)
GHG Protocol & Scope 1, 2, 3	- Most commonly used - Internationally recognized - Precise regulations - GRI & ESRS refer to it	- Challenging (especially Scope 3) - Contents can be omitted	- Substandard for determining CO2 emissions along the value chain of an organization - While Scope 1 measures the direct GHG emissions and Scope 2 the indirect GHG emissions, Scope 3 determines additional indirect emissions along the entire life-cycle of a product or service	- Activity data, emission factors and GWP potential values from own organization, suppliers and other partners along the value chain

CSRD	- Comparability of organizations and increased transparency - Hinders greenwashing by not allowing to publish any other information than suggested by renowned standards or laws - Not allowing to omit information	- Enormous scope of information to be reported - Only little time until the law comes into force	- EU law and mandatory framework for sustainability reporting (from 2025)	- Data on a huge range of social performance (e.g. child labor, health and safety), or environmental (e.g. biodiversity, water, CO2 emissions)

4.1.2.1 GRI

The Global Reporting Initiative (GRI) standard is an international voluntary guideline that has gained widespread recognition as the most widely used reporting framework (Searcy, 2012; Toikka, 2023), a fact confirmed by the perspectives of the companies interviewed (Interviewee 1, 5, 6, 7, 10, 11). The GRI covers a wide range of social and environmental indicators on topics such as child labor, health and safety or biodiversity, water and CO2 emissions (GRI, 2022).

The main advantage of their widespread use is the increased comparability between companies (Interviewee 3, 10, 11). However, this view was relativized by consultants (interviewee 3) who highlighted the potential for information omissions within the standard. As interviewee 4 pointed out: "*We follow the GRI standard in the preparation of our non-financial statement, but we also take the liberty to deviate from it*". As a result, this makes comparability more difficult, which is a major drawback compared to legally binding reporting standards or guidelines that require mandatory compliance (Interviewee 3). Moreover, it is anticipated that the significance of the GRI standards will diminish progressively, particularly in the European context, due to the mandatory implementation of the CSRD. "*In theory, you could use it because it's an official standard, but nobody will do the work. Therefore, nobody will use it anymore*" (Interviewee 3). Interviewee 10 also highlighted another drawback, citing the GRI standard's current emphasis on CO2 reduction while there is not much specification with regard to biodiversity yet.

4.1.2.2 GHG Protocol & Scope 1, 2, 3

As a standard or guideline, the primary purpose of the **GHG Protocol** is to help companies effectively manage and progressively reduce their CO2 emissions over the long term (Worldfavor, 2023). However, it is occasionally considered as a "*sub-standard*" (interviewee 7) due to its alignment with other reporting standards. As interviewee 3 points out, both the GRI and the ESRS refer to the GHG Protocol, which necessitates the collection of emissions data in accordance with its guidelines. As with the GRI standard, the multiple adoption of the GHG Protocol was confirmed by the interviews (interviewees 1, 5, 6, 7, 9, 10, 11). The consistent application of the GHG Protocol by all energy providers interviewed emphasizes the importance of reducing carbon emissions in the energy sector (Shahbaz et al., 2020). Interviewee 6 succinctly expressed this notion by stating: "*I mean, it's the tool that anybody uses. This is the commonly agreed guideline on defining, measuring, reporting on*

GHG emissions throughout the value chain. There's no way around GHG protocol. There's nothing else we would use". To determine these emissions, "*activity data, emission factors and global warming potential (GWP) values*" (Greenhouse Gas Protocol, 2011) are needed from suppliers and other partners along the supply chain.

In addition to its widespread use, the GHG Protocol is also valued for its clear guidelines and international recognition (Interviewee 1). However, a notable drawback of this standard is the considerable effort required, particularly in determining Scope 3 emissions, as discussed later. Interviewee 5 explains this challenge: "*Because the number of stakeholders who are supposed to collect data somehow or who are supposed to provide something in addition, just increases the longer I look at the value chain. And that is challenging*".

Another drawback mentioned in the interviews is the potential for data omissions similar to the concerns raised in relation to the GRI standard. This lack of full data disclosure could again hinder comparability between companies (interviewee 3). However, this limitation is expected to be mitigated by the forthcoming obligation within the CSRD framework.

Scope 1, 2, 3

One of the key components of the GHG Protocol is the identification of the so-called Scope 1, 2, 3 emissions. In practice, this calculation method is already frequently used, but there are difficulties - in most cases for Scope 3 - in determining them. In this vein Interview 3 therefore describes "*Scope 3 is by far the most important, but also by far the most difficult*".

Scope 1 determines the direct GHG emissions of an organization that arise from sources owned or controlled by the company. **Scope 2** measures the indirect GHG emissions of an organization that arise from the generation of purchased and consumed electricity (Pham & Sullivan, 2022). For the majority of companies in the energy sector, particularly those active in energy generation rather than distribution, their computed Scope 1 (direct) emissions represents the proportional Scope 2 (indirect) emissions of those companies that are their customers. The calculation of **Scope 3** emissions is, as mentioned before, the one that still causes the most difficulties in practice. It is intended to determine additional indirect emissions that arise from the entire production, transport, use and disposal of the manufactured product (Pham & Sullivan, 2022).

According to the GRI Advice on the GHG Protocol (GRI, 2016) and the scope calculations, there are a total of 15 categories for Scope 3 (8x upstream and 7x downstream categories) for which an organization should achieve the corresponding GHG emissions from its suppliers (upstream) and consumers (downstream). Interviewee 5 states: "*I think there are two main pitfalls. One is, do we know any data at all? For example, business trips and employee commuting. Both are in there. The question is, how do I get this data at all? How do I record it at all? Because this is not something that is normally recorded in day-to-day business. Business trips are, but commuting is much more likely not. And the second thing is, how can I determine these emissions at all?* "

In practice, standardized emission factors are commonly used for these purposes, often expressed as grams of CO2 per unit of purchase volume (interviewee 4). It's worth noting, however, that standardized flat-rate values are not universally adopted, leading to challenges in terms of comparability (interviewee 11). According to interviewee 5, however, these are the major issues they

have been dealing with so far: "*how do I get such data that are not normally recorded and what emission factors do I actually have?*"

Interviewee 4 adds that some of this data can be sourced from integrated databases such as Ecoinvent via tools such as SAP Product Footprint or IBM Envizi. However, complexities remain, particularly in determining the raw materials used by a supplier's own suppliers. As interviewee 4 points out, "*You often only know the tier-one supplier, the one you deal with directly*", which makes the collection of data along the value chain very difficult.

4.1.2.3 CSRD

As described in the conceptual background, the CSRD is a legally binding regulation within the European Union that requires companies in all member states to report on various sustainability-related aspects from the financial year 2024. As the successor to the NFRD, this legislation now has a much wider scope, affecting approximately 49,000 companies in the EU, compared to the previous figure of approximately 11,700 companies.

Standardized reporting has a number of benefits, including improved comparability of organizations and increased transparency (Stasiškienė & Šliogerienė, 2009). These benefits also apply to the CSRD due to its mandatory nature. Interviewee 3 highlights another key benefit of this law, stating that "*you can't include any other information that doesn't come from a standard or a law, so it doesn't happen that companies define something for themselves and just write something down, which could lead to greenwashing*". The CSRD does, however, allow for exemptions, such as company-specific indicators, but only if justified. Nevertheless, Interviewee 3 argues that the regulation will notably hinder companies to publish irrelevant information that puts a company in a better light and is misused for marketing purposes.

In addition to promoting better comparability (interviewee 1), the CSRD has an advantage over the GRI (interviewee 3) by limiting the scope for companies to select topics or omit KPIs. As interviewee 7 succinctly put it, "*our scope to select topics, omit topics, omit KPIs is less*".

A significant change brought about by the implementation of the CSRD concerns the breadth and depth of the information to be reported. This observation is shared by both the consultants interviewed (interviewees 2, 3, 4, 8) and the sustainability managers in the energy companies (interviewees 1, 5, 6, 7, 9, 11). Interviewee 5 affirms this change, stating: "*In concrete terms, it is above all the scope that is changing. So even though we are already obliged to report [...] we already notice that the scope is growing. That is the essential difference*". Many topics are mandated by the CSRD, including risk assessment (interviewee 1), materiality analysis (interviewee 3), planning of sustainability issues and interventions (interviewee 5), among others. However, many companies are only beginning to address these aspects (respondents 5, 7). Companies that were previously subject to the NFRD, the predecessor to the CSRD, are in a better position to prepare for the upcoming requirements than those that have not yet been subject to reporting requirements. For the latter, Interviewee 3 characterizes the situation as follows: "*They know something is coming. But they don't have anything yet*".

To illustrate the broad reach of the CSRD, interviewee 7 from a globally active energy company stated: "*What we have started to do at the moment is to analyze what CSRD actually means for us*

and to make a kind of GAP analysis - where do we stand today? And we have seen that we have round about 35% to 40 % of the disclosure points yet". This narrative, combined with the broad scope of the CSRD and the current status quo of many companies, serves to underscore the significant implementation challenges. As interviewee 3 puts it in a nutshell: "*It is far too much, too fast and too few people. It will not be implementable*." (Interviewee 3)

ESRS

The European Sustainability Reporting Standards (ESRS) serve as specific guidelines for the reporting of sustainability-related data and indicators, which are mandatory as part of the CSRD (Interviewee 3). Analogous to the International Financial Reporting Standards (IFRS), which govern financial statements at an international level, these standards create a comprehensive framework for sustainability reporting, as mandated by the European Union.

According to interviewee 3, these standards are currently being formulated and will be mandatory for all companies covered by the CSRD from the financial year 2024 onwards, starting in 2025. As interviewee 3 explained, "*You have to apply ESRS and you are only allowed to include legal requirements and certain standards and no longer just anything*".

NFRD & national laws

The national laws, such as the NaDiVeG in Austria (Interviewee 3) or the CSR-RUG in Germany (Interviewee 5), which must be complied with in the course of the currently applicable NFRD by a certain amount of firms (ESG Cockpit), will be replaced by the CSRD. Interviewee 3 substantiates this claim as follows: "*Well, you could theoretically use those, for example, because it's an official standard, but nobody will do the work*"

4.1.3 Sustainability Assessment Tools

In the following chapter on Sustainability Assessment Tools, various tools within this category are examined in more detail, briefly summarized in Table 14. The results derived from the application of these tools have traditionally served the dual purpose of informing management decisions and fulfilling mandatory reporting requirements imposed by legislation such as e.g., CSRD.

Table 14: Advantages and disadvantages of Sustainability Assessment Tools

Sustainability Assessment Tools	Advantage	Disadvantage	Definition & key aspects	Data input
Materiality Assessment	- Good for prioritizing sustainability issues - No complex, expensive tool necessary - Results provide ideal basis for strategic decisions - Comparison of	- Application can vary	- Tool to identify the most material sustainability issues of an organization in line with stakeholder requirements	- Key issues for management and stakeholders

	external perception / self-perception through stakeholder engagement - Driver for innovation			
GAP-Analysis	- Assessment of current status and identification of missing data	- Lack of consideration of the market or the competition	- Management Tool to identify the current status (with regard to sustainability aspects) and to compare it with strategic goals	- Information on the current state of an sustainability issue and its desired state
Risk Assessment	- Awareness of the most important risks and factors - Risk screening along the supply chain	- Detailed information required that takes a long time to obtain - Focus is often on sustainability in the context of production costs	- Process to identify, analyze and manage the (potential) sustainability risks of an organization	- Current and historical data (e.g. from media reports)
Lifecyle Assessment	- Results can be used for other products or development of new ones	- Time-consuming - Complex - High costs	- Systematic analysis to determine the environmental impact along the entire value chain of a manufactured product or service	- Energy use of manufacturing and waste procedures and data on used raw materials

4.1.3.1 Materiality Assessment

The (Double) Materiality Assessment, which is mandatory to be conducted by the CSRD „*provides companies with a tool to capture stakeholders' perspectives on ESG, sets a course, and indicates where future investment may be required*" (Fantini et al., 2023) The Materiality Analysis is a very clearly defined enquiry process where it is also required to involve stakeholders. This can be seen as very positive and advantageous, as it identifies not only the issues that are considered essential for an organization or its management, but also those of internal and external stakeholders (interviewee 7).

The Double Materiality Assessment is already extensively used, with all energy providers interviewed (1,5,6,7,9,10,11) using it on a regular basis - for example, interviewee 1's company conducts it about every 3 years. The reason for its frequent use lies not only in the imminent CSRD obligation, but also in the fact that this assessment serves as a reasonable first step when starting or deepening the analysis, as explained by interviewee 8.

According to interviewee 4, this analysis can be carried out as a guided survey, but also through smaller separate tools: „*There is IBM Envizi, which has a double materiality analysis as a query, and*

then it is documented. Many companies work with Excel and that is sufficient for the auditor, as long as the documents are filed and the assumptions are correct". In line with the previous statement, other interviewees shared the view that a complex external tool is not essential for conducting the Materiality Assessment. They see it as rudimentary tasks (interviewee 7) that can easily be carried out via SharePoint (interviewee 4) or commonly used survey tools such as Survey Monkey or Lama Poll. To ascertain an organization's most material sustainability concerns employing this tool, it therefore necessitates the information derived from the standpoint of the respective stakeholders and the management's internal perspective.

A major benefit of the Double Materiality Assessment is that "*you just get a better view of the DNA of a company*" (interviewee 11) and "*it's a great tool to priorities sustainability efforts*" (interviewee 6). The evaluation and subsequent prioritization of key issues is typically carried out by applying concrete criteria in terms of scale, scope, and likelihood, as required by the ESRS guidelines (interviewee 4).

An additional advantage of this assessment is that its results provide an insight into the most important issues related to the sustainability of an organization that can be used as a basis for strategic decision-making or other tools. This finding was confirmed by most interviewees from energy companies (interview 1,5,6,9,11). Interviewee 1, for instance, describes their approach as follows: „*Based on the materiality analysis, we look at which topics of corporate management require strategic management - through the level of ambition - and which are managed operationally, so to speak, and which are simply taken along without being managed to any great extent*".

In addition to being identified as an important driver of innovation (interviewee 11), materiality analysis was noted as having the great advantage of facilitating a comparison between self-perception and external perception through the stakeholder survey. Respondent 9 described this as follows: "*Basically we think it is positive because on the one hand the issue of stakeholders is very much taken into account and we actually had a different picture in certain areas than our external stakeholders. This was very exciting for us. And in the materiality analysis itself we will have to adapt the strategy process accordingly, which we believe is rather advantageous".*

The only negative aspect of materiality analysis noted was that „*it's a methodology and it's interpreted very differently in different companies and by different consultants*". Interviewee 6 further explained: „*So I worked in a few companies in Vienna and my company now, where materiality analysis is done not in a very different way, but with different nuances. And now with the CSRD requiring a double material mortality analysis - that's another level of complexity and divergence of how companies interpret that*". Overall, the diverse approaches employed in materiality analysis can indeed yield different outcomes, as acknowledged by Interviewee 6. Nevertheless, given that the primary purpose of Materiality Analysis is to guide the internal strategic direction of a company, the drawback of reduced comparability can be considered less significant compared to only report sustainability figures and data.

4.1.3.2 GAP Analysis

Given that a sufficient amount of lead time is typically required to collect all the necessary sustainability data for the CSRD, many companies are currently conducting GAP Analyses to assess

their current status and identify areas where data collection or reporting is still lacking (interviewees 3, 8).

In general, the GAP Analysis is used to compare the current status of a sustainability aspect with its desired future status. The main purpose is to review and, if necessary, adjust previous goals and strategies (Callison, 2023).

Typically, the GAP Analysis constitutes the subsequent step, building on the Materiality Analysis. This sequence is often followed by companies with established sustainability practices and reporting procedures. In contrast, companies that have not yet published any sustainability data often choose the GAP Analysis as the first step to gain initial insight into the available data. Given the extensive requirements of the CSRD, as described above, the evaluation of existing data and the identification of data that still needs to be collected is an important part of this process (interview 3). However, a major drawback of this Management Tool is notable absence of consideration of market dynamics and competition (Ollmann, 2021).

4.1.3.3 Risk Assessment

In established, globally operating companies, the existence of a comprehensive Risk Assessment framework is common practice. In the context of sustainability-related risks, such as climate risks, the imperative is to integrate them seamlessly into the existing risk management infrastructure, as interviewee 5 aptly put it: "*I then go into the risk management protocols, look at their practical implementation and try to bring sustainability risks into this established framework*".

In general, the Risk Assessment can be described as a process to identify, analyze and manage (potential) sustainability risks of an organization. According to interviewee 6, there are "*different tools from just doing kind of internal risk assessments to going into more data driven risk assessment tools*". The latter is the case, for example, with risks that are looked at along the supply chain. In this context, for example, one looks at whether a negative event such as floods, occurs somewhere at the supplier. This Risk Assessment can also be seen as media analysis or media screening, where newspapers are automatically searched for the names of suppliers (Interviewee 4).

At the same time, the risk assessment process has the added benefit of increasing awareness of critical factors and risks, as expressed by interviewee 11. Interviewee 1 outlines her organization's approach, where sustainability risks are first documented in Excel and then material concerns are incorporated into the group's broader risk management system. "*The goal is indeed, and this already happens with the major risks, that they are incorporated into the group's risk tool. Not that it is done separately, that is part of it*" (Interviewee 1).

On the other hand, a drawback of this Management Tool is that it requires detailed data, which is typically associated with a high expenditure of time. On the other hand, a drawback of this management tool is that it requires data, which is typically time consuming. In addition, sustainability risks are often assessed with a focus on production costs rather than a broader sustainability perspective such as the TBL framework (Schulte & Knuts, 2022).

In practical terms, prioritizing specific risks leads to an advantageous understanding of which risks should be included in the scope of scenario planning (see chapter 4.1.4.1 Scenario Analysis), as

articulated by Interviewee 1. Leading consultancies such as KPMG have developed dedicated tools, in particular with regard to transition scenarios, that are widely used in practice. However, software solutions such as SalesForce are also commonly used in this context, as highlighted by interviewee 4.

In the course of the CSRD, various risks also have to be covered by the ESRS. For example, Interviewee 1 states that in relation to biodiversity they look at: "*Where are my biodiversity risk areas, where are my water stress areas, where are my plants, where do they overlap?"*

For overall Risk Management, SAP is a common and often chosen solution (interviewees 4, 5), which, for example, flags supplier risks and can run automated processes. Other separate software solutions include Osapiens with a focus on the Supply Chain Risk Management Act, IntegrityNext as a very common solution or Prewave (interviewee 4).

4.1.3.4 Lifecycle Assessment

A very common tool in the field of Sustainability Assessment is the Life Cycle Assessment (LCA). It is a widely accepted and internationally recognized calculation method. It enables the comprehensive evaluation of the environmental impact of processes and products, including the consideration of impacts throughout the entire supply chain (upstream), during use (core), and finally at the end of their life (downstream) (Bearing News, 2022). In the context of a LCA, the data required typically includes a range of information on the consumption of raw materials, the use of energy resources and the generation of waste materials.

Interviewee 2 confirms that the lifecycle assessment is already very widely used in practice, especially in the analysis phase. Interviewee 1, on the other hand, reports from the perspective of an energy supplier that they use the GEMI system from the German Eco-Institute as a LCA Tool, but that this is used less frequently.

According to interview 4, the question of how often such a LCA is applied depends strongly on the product being measured. However, the use of this method in general can have its advantages. Besides the general function of quantification and localization of the emissions sources and the thereby calculable carbon intensity of a single product (Bearing News, 2022), the outcomes of this tool also provide valuable insights for other areas. A LCA can enable to identify risks and responsibilities related to harmful emissions of greenhouse gases and to manage them accordingly (Bearing News, 2022). The results can thus be used, for instance, for the development of products or for similar products to increase their recyclability or to reduce the associated ecological footprint (Interview 4, 8). According to interview 4, this tool is not necessarily used for reporting purposes (unless one is obliged to do so), but for the area of sustainability improvement (also see Inside-Out approach in Chapter 2.3.2.), "*in order to change something in product development and make the product more sustainable*". However, a drawback of LCA is their potential complexity involving an enormous amount of time, which often comes at high costs (Interviewee 7).

Interviewee 4 pointed out that this tool requires a separate software solution. Usually there is no comparable tool, which means that it cannot be integrated anywhere.

In the case of LCA in the energy sector, this analysis is more difficult than in other industries because

of the product sold. Interviewee 5 summarizes this issue with the following quote:

> *„Of course, you can think about it - we are also building grid infrastructure, so you can also do a lifecycle assessment of the facilities or the pipeline or something like that. This is carried out, of course. [...] However, we are not a classic product company where you say, to stay with the example, LCA Tool, I put a toaster in there and then it comes out at the end that the footprint of the toaster is something like this. That's not what we have, no.*"

Accordingly, carrying out a LCA is difficult for utilities when it comes to the product „energy", but it can be done alternatively for grid infrastructure, for instance.

For the energy sector in particular, it is crucial to emphasize that a conventional LCA for pure energy production does not yet exist or is not considered meaningful, as interviewee 6 points out. Initiatives are now underway to establish a comprehensive and standardized framework for this purpose. Interviewee 6 explained: "*We're developing an LCA Tool ourselves because that doesn't exist. We are involved in the Task Force for Nature related financial disclosures for the nature of related Accounting Tool creation, so to say. […] We're developing together with Carbon Trust. We're developing the first industry's backed method for calculating lifecycle carbon footprint of renewable energy projects. That doesn't exist so far. So we're basically partnering up with carbon Trust to put that in place. So it's something that all companies would use as a standardized framework*".

In this context, interviewee 7 mentioned that for smaller LCAs they had been using the tool OpenLCA, however, he anticipated that this issue would become more important to them in the future leading them to look at it in more depth.

Interviewee 9 also brought up the term "lifetime extension" in relation to LCA, which addresses questions such as: "*PV is indicated at 20 years, maybe they will still be producing something in 25, 30 years?*".

4.1.4 Sustainability Management Control Tools

As summarized in Table 15, this chapter focuses on Sustainability Management Control Tools, which typically have a higher strategic importance and are primarily kept for internal use, rather than being included in the scope of external reporting procedures.

Table 15: Advantages and disadvantages of Sustainability Management Control Tools

Control Tools	Advantage	Disadvantage	Definition & key aspects	Data input
Scenario Analysis	- Integration of sustainability at group level - Possibility of adjustments through ongoing monitoring	- Time consuming - Incorrect assumptions can lead to unrealistic results	- Strategic forecast model to analyze developments in the future	- Qualitative data (e.g. industry trends) and (historical) quantitative data (e.g. CO2 emissions or their costs)

Benchmarking	- Stimulates competition	- External data needs to be purchased	- Method to perform comparative analyses on the basis of reference values	- Data from competition of industry (e.g. CO2 emissions, water consumption, waste generation)
Incentives	- Can motivate employees	- Hardly used in practice yet	- Incentives designed to encourage heightened motivation in individuals	- Metrics and goals which are to be achieved e.g., by a (sustainability) manager
Sustainability Balanced Scorecard	- Integration in traditional BSc	- Hardly used or known in practice yet	- Extension of the classic Balanced Scorecard to include one or more sustainability aspects	- Sustainability performance indicators such as e.g. CO2 emissions, water consumption, waste generation

As previously explicated in the Conceptual Background section of this Master's thesis, (Sustainability) Management Control Tools are employed to facilitate the attainment of sustainable objectives, evaluate strategic alternatives, and identify relevant improvement measures. Complex analytical software solutions are therefore used to set adequate actions and management decisions (Schönherr et al., 2019).

In common practice, and as reflected in the academic literature, data serve as the basis upon which measures are constructed. These measures are then used to move the process from act towards plan, so to speak. Interviewee 3 describes this process as follows: "*Tracking of: Do I have measures in the plan, do I have my initiatives, how do I address the results from my lifecycle assessment? And the act would then be this follow-up. Weekly, monthly. Is there any progress? Have I reached my milestones? Have I changed KPIs? In the monitoring, I then look at how things are changing*" (Interview 2).

As described, these tools "*can be backward looking when applied to analyse and improve existing sustainability management systems*" (Schönherr et al., 2019a), often also referred to as "ex-ante" (interviewee 1). Conversely, they can also take a prospective or "ex-post" (interviewee 1) approach, for example when there is a need for supporting a specific decision-making process.

4.1.4.1 Scenario Analysis

Scenario Analysis is a Management Control Tool that "*enable[s] the weighting of strategic options or scenario building to support concrete decision-making processes*" (Searcy, 2012). It serves as a forward-looking assessment to analyze future developments and guide strategic management decisions. As highlighted in chapter 4.1.3.3 Risk Assessment, scenario planning often overlaps with or builds on risk assessment. Typically, both tools are used together in software solutions (interviewee 4). The data required for this tool can be both qualitative, covering industry trends and the like, and (historical) quantitative, using metrics such as CO^2 emissions and their cost implications

(Manifest Climate, 2021).

Fundamentally, this tool focuses on the creation of pathways (Interviewee 4). To illustrate this concept, Interviewee 2 provided a practical example: "*What would it mean if net-zero, if that would be our hypothetical target now, or minus 50 % of minus 80 %. If you want to achieve that by 2030, then it needs certain scenarios with a certain - a certain commitment to, let's simplify it, just money. If you say that it's fine until 2040, then you have another scenario. And depending on the intensity with which you want to proceed, you have scenario analyses or different pathways that you could go down, that could be done through operations research - you then always have some conditions or boundaries that hold you back*". In particular, the latter conditions or boundaries should be identified through ongoing monitoring, and subsequently require regular adjustments.

Interviewee 5 also mentioned, for example, that they had focused on the topic of climate in recent years following very detailed climate risk analyses. The results were then passed on to the corresponding planning department, which in turn calculated various scenarios regarding climate neutrality (interviewee 5).

However, it is important not to overlook the drawbacks of this tool, including the considerable amount of time required, as well as the problem that „*incorrect assumptions can lead to models that are way off the mark*" (Hayes, 2022).

4.1.4.2 Benchmarking

Another Management Control Tool is Benchmarking, which involves comparing companies in the same industry (Global Environmental Management Initiative, 1998). For this purpose, data from competitors is needed, for example, quantitative data such as CO^2 emissions, water consumption or waste generation.

Among others, Interviewee 7 cites Benchmarking as one of their tools for managing sustainability. For example, they use tools that allow them to "*buy in external data [and] use data that is not generated within our organization*". Some software solutions even allow benchmarking as integrated part the reporting tool (Interviewee 1), thus eliminating the need for a separate tool for this purpose.

Interviewee 8 emphasizes the positive aspects of Benchmarking, claiming that it fosters healthy competition and drives companies to improve and ultimately become more sustainable.

4.1.4.3 Incentives

Several sources in the literature have recommended the incorporation of Incentives (Schaltegger et al., 2012) and linking them to sustainability targets, for example. It is essential to have a clear understanding of the metrics and pre-defined targets that need to be met, as these provide the essential links to align them with a manager's performance expectations.

Interviewee 3 also confirms that employees can usually be motivated by Incentives in the form of money or employee participation (Interviewee 2). In practice, however, this has not yet been an issue for the energy suppliers interviewed. According to interviewee 3, however, the first companies (without validity explicitly for the energy sector) are starting with variable board remuneration in connection with sustainability goals.

4.1.4.4 Sustainability Balanced Scorecard

The Sustainability Balanced Scorecard is a framework that can be used as an extension to the traditional Balanced Scorecard or as a stand-alone sustainability scorecard. Interestingly, the expert interviews revealed that this tool is rarely used by the companies surveyed, with only a handful of respondents even being aware of its existence. However, after a brief overview of both versions of this tool, the majority of respondents expressed a preference for incorporating it as an integrated component of an existing Balanced Scorecard, in case a Balanced Scorecard is already in place. However, if applied, a variety of leading and lagging indicators (Andrian, 2022), for example CO^2 emissions, water consumption, waste generation, are needed.

4.2 Success factors for Sustainability Management Tools

The subsequent chapter addresses the second research question of this Master's thesis, which aims to elucidate the prevailing success factors observed among key players within the energy sector at different organizational levels. The differentiation of these organizational levels is considered valuable in order to "in order to obtain actionable information at the level required to meet user needs" (2019). Consequently, the following sub-sections examine success factors across organizational, sub-organizational / departmental and individual levels.

4.2.1 Success factors at corporate level

At the company level a number of success factors are presented that relate to or influence the top levels of the organization. As shown in Table 16, eight success factors could be derived at this group wide level.

Table 16: Success factors at corporate level

Success factor	Definition	Example
Integration into existing (management) tools	In cases where analogous Management Tools already exist within an organization, SMTs should be integrated into them	For interviewee 1, in her role as a sustainability manager, the primary objective is to integrate sustainability into existing business processes rather than establishing it as an external, parallel entity.
Governance	Clear structure of responsibilities in particular between sustainability department and individual other departments	The better the governance and responsibilities in an organization are clarified, the easier it is to assign new responsibilities to people when implementing new tools
Flexibility and adaption of a firm's context	Use SMTs in the way that best suits an organization, taking into account its own business circumstances	Flexibility is important in the sense of not taking things for granted and to always take the context into mind. And that is both companies' context as well as social as and environmental context in which the company is operating
Selection of adequate indicators	Selecting. Those KPIs that lead to a solid foundation for management decisions	Ultimately, management decisions are the core of the issue, underscoring the importance of selecting tools that provide a solid foundation for sound decision making

Communication with stakeholders	Engage in dialogue with different stakeholders to understand their needs	Having partnerships and continuous exchange with important players such as NGOs is related to the success of environmental actions and tools by several experts
Commitment of management board towards sustainability	The level of interest expressed by the Management Board in matters pertaining to sustainability	From the experience of several interview partners one of the most important thing is simply whether the top management of a company is behind the issue or not
Upskilling	Acquiring new skills to improve employees' knowledge and current activities	Employees should have to do training so that they understand, for example, what the Scope 1, 2, 3 emissions of one's organization are
Consistent tool at group level	Consistent use of the same tool across the group	In cooperation with subsidiaries an organization should use the same platforms, i.e. consistent systems – even though it is not realistic and easy to implement

4.2.1.1 Integration into existing (management) tools

One of the most important factors, if not the most important, is the integration of Sustainability Management Tools into existing tools and systems. Without exception, all interview partners of both sustainability managers and consultants mentioned this issue as a success factor, in most cases as the first and most important factor for SMTs.

This aspect is not only relevant to the various types of SMTs but is also the reason for certain other success factors, such as "governance & clear structure" or "cooperation between Group Development and individual departments". Interviewee 5 aptly underlines this aspect with the following comment: „*I'm in Group Development in Sustainability Management. And we have the task of developing each division - however defined - from a sustainability perspective. That's why we don't necessarily use only very specific, centrally controlled tools. This means that when we talk about risk assessment, for example, I go to risk management and see what they actually use and try to incorporate sustainability risks into it. And that's how we do it in other areas as well*" (Interview 5).

It is necessary to acknowledge at this point that existing systems may not always have identical capabilities. Nevertheless, Interviewee 2 asserts a crucial consideration: „*when I look at it abstractly and independently of the system it must not be a separate system, it must be integrated*".

The integration of sustainability into a company, which by definition is the task of SMTs (see chapter 2.3.1), should pursue the goal of implementation in existing company processes and not the goal of a parallel implementation of sustainability (Interviewee 1). Not to have sustainability run in parallel and to embed it as far as possible in the individual corporate divisions or deparments and their systems also has the additional advantage that no additional processes are created just to collect sustainability data (Interviewee 5).

4.2.1.2 Governance & Clear structure of responsibilities

In order to achieve effective integration of the aforementioned implementation success factor into existing tools and systems, a well-structured governance framework, characterized by dedicated

steering committees and the involvement of key stakeholders, is crucial (interview 1). Correspondingly, interviewee 4 underlines this perspective by emphasizing "*how well all these processes are already set up, because a tool can only then fit into an extension of the existing IT landscape through good existing governance*".

Notably, the "*assignment of responsibilities in the organization*" (Schaltegger et al., 2012), is of particular importance within the governance framework, in addition to setting goals and monitoring tasks (interviewee 4).

With regard to the software component of the tool, careful regulation of data access is essential, distinguishing between those who are authorized to access the data and those who are not. Interviewee 5 advocates an open access approach for 'all' employees to promote transparency, while emphasizing that the handling of specific sustainability data should remain in the hands of responsible personnel.

In addition, the implementation should be technically easy to manage, "that accesses are given and taken away again and role changes that update themselves in an integrated way" (interviewee 4). Such provisions are essential to prevent unauthorized access by former employees or those not assigned to relevant roles. This clear allocation of responsibilities is according to interviewee 7 of particular relevance in the context of audit and oversight bodies.

4.2.1.3 Flexibility and adaption on firms context

Another important success factor is flexibility and the adaptation of an SMT to the company context. Interviewee 6 underscores this principle with the following statement: "*Flexibility is key. And understanding that, you know, you shouldn't just take things for granted, then you have to always take the context into mind. And that is both companies' context and the kind of the social as well as environmental context in which the company is operating*".

This means that a tool should have the ability to adapt to the unique dynamics of an organization. While the notion of corporate context encompasses aspects such as the ability of a system or tool to aptly address the organizational structure or process orientation of a company, the environmental context encompasses facets such as the prevailing trends currently shaping the industry.

Despite certain tools being marketed as *„are branded as universally or globally applicable"* (Schönherr et al., 2019), it remains essential to carefully evaluate the adaptability of an SMT to the unique parameters of the business context during the selection process.

4.2.1.4 Selection of adequate indicators

In the literature, Searcy (2009) for example mentions that at this time little was known about the use of indicators in practice, although he himself together with other scientists proposed *„a sustainability ''indicator integration model'' for a major Canadian electric utility*" (Searcy et al., 2007) with the aim of supporting firms with integrating indicators (Searcy et al., 2006).

The findings, derived from interviews with experts from major energy utilities in Europe, show that the selection of sustainability indicators is mainly influenced by legal mandates such as the CSRD or the EU Taxonomy, as well as the extensive range of indicators proposed by voluntary standards such

as the GRI. As a result, today's companies rarely choose their indicators on their own. Rather, they are faced with a large number of mandatory or suggested indicators, requiring them to priorities the calculation and disclosure of these metrics over any additional choices (interviewee 1, 4). Interviewee 1 described this situation succinctly as follows: "*We have a colorful bouquet of indicators where we don't need any additional ones*". This perspective concerns the selection of indicators regarding reporting and disclosure.

"*Monitoring is one thing - but it doesn't help if you can't draw any conclusions from it. Therefore, it is important to look at the right KPIs. Accordingly, to be able to draw conclusions from them and to make management decisions - and that's what it's all about in the end*" (Interviewee 2). As described, amidst the multitude of reporting indicators available, the task of selecting the most crucial KPIs out of these is of paramount importance from a strategic, internal standpoint. The chosen KPIs must be tailored to the specific context of the company, building a foundation and the formulation of effective management decisions for achieving success.

4.2.1.5 Communication with stakeholders

Another success factor at the organizational level is active engagement and skillful communication with an organization's stakeholders. Having a high level of cooperation with diverse stakeholders (National Research, 2011) and establishing "*partnerships with (...) key actors*" (Interview 10) is a crucial determinant for the integration of sustainability within a company. This stakeholder engagement is not only "*„necessary for the application of any sustainability indicators performance*" (Kocmanová & Šimberová, 2014) but also mandatory due to the CSRD as an integral facet of the materiality analysis, as detailed in chapter 4.1.3.1. As interviewee 11 articulated, the stakeholder engagement as part of the materiality analysis process revealed that stakeholder expectations were not aligned with the organization's strategic objectives, indicating a potential need for alignment.

As interviewee 5 points out, political stakeholders and non-governmental organizations (NGOs) in particular are key players for companies operating in the energy sector. Fostering effective communication with these players can therefore bring significant benefits. The increasing importance of working with NGOs, particularly on sustainability issues such as biodiversity, emerged as a notable point of emphasis among the insights shared by the experts interviewed (Interviewee 10).

4.2.1.6 Commitment of Management Board towards Sustainability

"*From my experience, the most important thing is simply whether the top management of a company is behind the issue or not*". This is how interviewee 9 sums up the most important success factor in integrating sustainability into an organization and similar comments were made by several other interviewees (2, 3, 4, 5, 8, 9, 11), further emphasizing the importance of this determinant.

In the case of a lack of board commitment, even the most thorough execution of various SMTs can become useless if they do not serve as a basis for consequential decisions of the board. Conversely, a strong commitment can have a powerful effect on employees, as interviewee 3 explained: "*At an individual level, the most important thing is to be sure that one's efforts are producing substantial results*".

In addition, board commitment plays an essential role in securing the necessary resources for any

sustainability initiatives. Interviewee 4 offers an insightful perspective on this issue, stating: "*Ideally, the CFO, CIO is involved and at least supported by the CEO, since it is also relevant for him. It's about changing his company, it's a transformation and it should be seen as such*".

One indication of whether the board has a strong commitment to sustainability, for example, is whether there is a Chief Sustainability Officer (CSO) and whether this person is actually part of the C-level board. If this is not the case, interviewee 2 describes it as "smoke and mirrors" and emphasizes the symbolic power of this fact.

Another exciting finding was that two interviewees (3, 8) from consultancy firms mentioned their experiences of negative examples in this context as, for instance, interviewee 8 described "*I myself have experienced meetings where we presented what is generally required for CSRD and ESRS in the future or what one has to be prepared for. And the board of directors sits there and says: Well, thank you for the presentation. What happens if I don't do that? What penalties do I have to pay for not wanting to deal with the issue at all?*" (Interviewee 8).

4.2.1.7 Upskilling

A crucial aspect of the path to successful integration of sustainability and SMTs is the competence of those employees who are directly dealing with these tools and the knowledge of all employees along the organization's workforce. These capabilities are discussed in more detail as a success factor at the individual level in the chapter 4.2.3.1. However, the realization of this capability depends on the education and training of employees. As interviewee 2 put it, "*the organization has to understand what it is all about*", implying the need to make sustainability understandable within the corporate framework.

If employees fail to grasp the purpose, their alignment becomes elusive. Hence, upskilling should help to mitigate potential resentment and opposition (Interviewee 2).

"*Involving employees through training*" (Schaltegger et al., 2012), often referred to as "upskilling" in the discourse of the experts interviewed, emerges as a key success factor (interview 2, 3, 10). It is important to stress that in this context, the above-mentioned commitment of the management gains renewed importance. Such commitment is essential to enable employees to see the coherence and rationale behind an organization's position, facilitated by increased training on sustainability issues (interviewee 2).

4.2.1.8 Consistent tool at group level

The success factor of establishing a "uniform" tool across the organization is a valid proposition in theory yet proves difficult to realize in practical application.

This approach is feasible and appropriate for companies that do not operate internationally or that are making their first steps towards corporate sustainability. However, for multinational companies or those already established in the adoption of various tools, this endeavor requires an immense and potentially disproportionate effort.

Interviewee 11 illustrates this scenario: "*For us, of course, the cooperation with subsidiaries is important, and for us it is definitely important that we use the same platforms, i.e. consistent systems*

- but this is not really realistic and easy to implement as things stand today". Expanding on this sentiment, Interviewee 7 believes that an all-encompassing "one tool fits all" tool is an "*illusion*" but envisions a future where a superior tool could unify the group, interfacing with SAP systems and other platforms.

Should the realization of a universal tool prove unfeasible, the consideration of a tool at the management or group level, linked to all existing tools and systems through highly automated interfaces, emerges as a viable alternative. Further insights into this can be found in the chapter 4.2.2.1 IT-Interface & automatization.

4.2.2 Success factors at interorganizational level

The following chapter lists a number of success factors that are relevant at the inter-organizational level, encompassing subsidiaries, divisions and departments. In addition to aspects that are primarily related to technical software solutions, considerations within and between different departments are also included.

Table 17: Success factors at interorganizational level

Success factor	Definition	Example
IT-Interface & Automatization	Automated data exchange through interfaces of tools and systems	In practice, Excel is commonly used, requiring manual export and import of data into other systems. The objective for companies is to move to automated processes to improve accuracy and minimize the likelihood of errors.
Databases & maintenance of data	Use and timeliness of databases	The reliability of the underlying data, including i.e., emission databases, was recognized as a critical factor, as was the need for data to be continuously up-to-date
Multilinguism of software	The capacity to employ a tool in multiple languages across the entire corporate group	The multilingualism of a software tool is also important as it facilitates the usage of a respective tool in the native language of all employees
Support from software provider	The support provided by the software provider in case of questions and ambiguities	In particular, in the context of preparing for sustainability reporting, respondents expressed a positive attitude if there was significant support from the software provider of the relevant tools
Easy handling and logical user interface	The structure and use of a software are logically designed	The software solution of tools should not be overwhelming in its structure and capabilities
Innovative spirit of sustainability department	When members of the sustainability team have an innovative spirit and are highly motivated	Interviewees from consulting expressed a very positive view of the development, with sustainability teams tending to be very enthusiastic about the subject and motivated by a sincere desire to promote innovation.
Collaboration of Group development or Sustainability department with individual	Collaboration between the Group development or Sustainability department and various other individual departments during the integration of sustainability into existing tools and	Sustainability management means developing business areas by involving sustainability, which requires appropriate cooperation, such as the clear allocation of responsibilities

departments	processes	

4.2.2.1 IT-Interface & automatization

"*A success factor for any kind of IT solution is that it has to fit well into the business processes that are already in place. That is very important*" as interviewee 5 describes. In the context of integrating sustainability into existing tools and systems, connectivity between them is also particularly relevant. IT interfaces between systems and tools and their automatization have therefore emerged as one of the most important components in this context. The aim is usually to have progressively fewer manual processes, such as an Excel export, and to link more and more interfaces in an automated way (interviewee 7). The simple reason for this is that it is less error-prone and, as interviewee 5 adds: "*Nobody has to know how to use an automated interface, so to speak*".

Accordingly, companies should ideally try to integrate SMTs into existing systems or alternatively dock them as an island system (interviewee 5) and connect them automatically as a data source (interviewee 4).

4.2.2.2 Databases & maintenance of data

In line with the frequently quoted adage "*you cannot manage what you do not measure*" (Cooper & Edgett, 2008, p. 54), the need to collect the necessary data for a specific tool and to establish appropriate databases is of paramount importance. As explained in the chapter 4.1.3.2 GAP Analysis, it is "*not possible to collect data overnight*" (interviewee 3), which emphasizes the necessity for companies that do not have such data to embark on this journey immediately, by means of a GAP analysis.

Nevertheless, certain data, such as for emissions databases in the context of climate risk analysis, are offered by software providers. In this regard, the timeliness and maintenance of the relevant data provided by the vendor also emerge as key factors influencing the choice of software solution. Interviewee 7 praises the Sphera software solution in particular for its effectiveness in addressing climate-related concerns.

4.2.2.3 Multilingualism of software

For large multinational companies with a global presence, the multilingualism of the software plays an important role, as interviewee 7 points out: "Multilingualism is also important for us, as it facilitates access to the software in the native language of the employees". Particularly in the context of considering a consistent tool for sustainability efforts, this facet emerges as key to promoting coherent use across the group.

4.2.2.4 Support from Software provider

Another relevant and beneficial aspect of choosing an SMT as a software solution is the support provided by the vendor, as explained by interviewee 7. In this context, the provision of robust support is important to ensure that users are not left in isolation and are given competent guidance in navigating the customer interface and the various functionalities of the software. This facet is

particularly relevant in the area of reporting, as there can be constant changes in large international enterprises underscores the need for dedicated support. In particular, software solutions such as SOFI, Thinktank and Sphera were cited as examples of effective support (interview 7).

4.2.2.5 Easy handling and logical user interface

The factor of simple usability and a coherent structure within the user interface was repeatedly emphasized by the interviewees as a decisive factor for the success of a software solution (interviewees 4, 5, 7, 11). Interviewee 4 characterizes these attributes as "*fundamental prerequisites*" to prevent users from being overwhelmed. In connection with a "*simple language*" (interviewee 11), a "*clear structure of operation and intuitive navigation*" (interviewee 5) were particularly emphasized as paramount in this context. The latter could be summarized as "*user experience*" (interviewee 4) and, according to interviewee 7, should provide a feeling "*like a journey where you fly through*". Sphera's software solution does not necessarily score highly in terms of clarity and ease of use, leading Interviewee 7 to suggest that there are superior software alternatives in this regard.

4.2.2.6 Innovative spirit of sustainability department

Besides the importance of this issue at the executive level (as discussed in the chapter 4.2.1.6 Commitment of Management Board towards Sustainability), the primary responsibility for integrating and implementing sustainability within a company lies mainly with the organization's sustainability department. Beyond a true and sincere commitment to sustainable development from the top, a key task of the sustainability department is to "*motivate as many employees and internal stakeholders as possible to participate*" (interviewee 9). In order to do this effectively, the Use of Change agents and value ambassador as described in chapter 4.2.3.4, is a reasonable approach.

An advantageous condition for this is, as described by interviewee 8, a consultant, that "*these sustainability departments are established in a youthful, dynamic environment*" and that the individuals in charge are typically driven by a high desire for innovation. In order to harness this increased dynamic, the necessary resources must be made available for these people and their department, which ultimately depends on the commitment of the company's management once again (interviewee 4).

In this context, it should also be emphasized that consultants (interviewee 3) advocate an increase in human resources in these business areas and departments in the coming years in order to adequately meet the increased demands expected due to the CSRD.

4.2.2.7 Collaboration of Group development or Sustainability department with individual departments

„*For us, sustainability management really means developing business areas by involving sustainability*" This is how interviewee 5 characterizes the role of his department. A similar approach to the long-term integration of sustainability into an organization is also articulated by other interviewees (4, 6, 7, 11). In line with the overarching goal of integration into existing tools and systems (as outlined in chapter 4.2.1.1), productive collaboration with other departments emerges as a key aspect. Depending on the particular tool or system to be implemented, cooperation with

departments such as Controlling (interviewee 1) or Core Strategy (interviewee 8) for Management Control Tools, or Accounting for sustainability accounting (interviewee 4), therefore becomes important. This interdepartmental exchange is particularly crucial for collecting accurate data and calculating the relevant metrics, ideally initiated from the beginning of the process, as interviewee 6 points out: "*I think what we, what we've learned is that it's - collaboration with departments that will be affected by whatever decision or sustainability action or commitment will come out of that, is key from an early stage. It just helps to integrate a lot of that thinking early on, much rather than, you know, run an assessment in the communal with a solution that nobody asked for (…)".*

The aim of working together during the process of integrating tools and systems is "*that the processes are then set up in such a way that I am not dependent on anybody [...] a system [must] be set up in such a way that I do not have myself as a success factor*", as interviewee 1, a sustainability manager, claims. Similarly, Interviewee 11 makes a particularly interesting statement: "*The perfect scenario would be that we actually dissolve our job by eight years from now, when it is all implemented and sustainability is established everywhere in the departments and the CSRD directive can be fulfilled*".

4.2.3 Success factors at individual level

At the individual level, four success factors have been identified, as shown in Table 18. In addition to the skills of individual employees, these include the dissemination of core values by key individuals, such as the CEO and members of the sustainability department.

Table 18: Success factors at individual level

Success factor	Definition	Example
Capabilities, awareness and commitment towards sustainability	The skills of individual employees and. their understanding of sustainability in the corporate context across all divisions and departments	The mindset and corporate goals regarding sustainability should be understood everywhere processes take place
Critical thinking of individuals	A process of actively questioning, analyzing and evaluating	Even if most organizations work with consultants, it is important to not take in everything for face value
CEO as Role model	Building trust with employees through actions and behavior of the CEO	A CEO should drive sustainability issues as a guiding principle to influence employee's motivation by building trust
Use of Change agents and value ambassador	People who act as mediators and value ambassadors	Some interviewees, coming from their Sustainability or Group development department, see themselves as value ambassadors

4.2.3.1 Capabilities, awareness and commitment towards sustainability

The importance of upskilling employees has already been highlighted at the corporate level as a success factor, and it is equally relevant to emphasize this aspect at the individual level, from the perspective of individual employees. This notion is particularly underlined by interviewee 2, who

stresses the importance of substantial upskilling to enable employees to understand the relevance of sustainability in the context of their company. The ultimate aim is for employees not only to gain an understanding, but also to cultivate a greater appreciation of sustainability. The aim is for employees to recognize that they are an integral part of the bigger picture (interviewee 2) and to engage personally with the issue, as interviewee 10 described "*in personal way of living*".

4.2.3.2 Critical thinking of individuals

Another key factor emphasized at the individual level relates to the critical thinking skills of staff working with the respective SMTs. As articulated by interviewee 6, this facet takes on increased importance when working with consultants. The emphasis is on "*not taking everything we hear at face value and consistently questioning [...] whether that input is the right one*" (Interviewee 6).

Ultimately, this aspect is about choosing the right tools and systems, taking into account the organizational context as described in chapter 4.2.1.3. Therefore, it is important to critically question "what we are trying to analyze or what we are trying to change or what we are trying to assess" (interviewee 6).

4.2.3.3 CEO as Role model

The importance of the commitment of the CEO as a member of the board of directors has already been highlighted as a success factor at corporate level in chapter 4.2.1.6 and was confirmed by several interviewees. In addition, due to his function as the highest decision-maker in the hierarchy of a company, the CEO as an individuum logically has the greatest influence on integrating sustainability aspects in an organization. Accordingly, this is an important aspect, as interviewee 2 states: "*If you don't have a CEO who is driving this as a guiding principle, then the organization is not going to do it. Role modeling is one of the key influencing factors*" (Interviewee 2).

"*This has to be said from the very top that it is important*", interviewee 3 also confirms this statement, which is ultimately important since it gives employees the impetus and motivation to see their sustainability efforts recognized.

4.2.3.4 Use of Change agents and value ambassadors

Just as the CEO serves as a role model, so should other employees within the company. An ideal and obvious solution in this context is, of course, that this comes from the Sustainability Department, as Interviewee 11 describes it: "*we have a value process and I see ourselves as value ambassadors, coming from our department*".

In addition to the communication of values from the sustainability department, the strategic use of informal managerial control mechanisms, such as change agents, also takes on importance. Interviewee 2 emphasizes this aspect: "*we always call it the multiplier model, that you have change agents in the organizations, typically people who are listened to more, informal leaders, who are not only there for the purpose of rank, but who actually do have more credibility and more trust, authenticity in the organization. That you use these people as multipliers, as "change agents*".

By cleverly leveraging change agents and value ambassadors, the long-term goal is for the entire workforce to take pride in their organization's sustainability efforts and seamlessly become

committed ambassadors themselves (Interviewee 10).

5 DISCUSION

5.1 Implications for managerial practice / sustainability management

In the short term, it is crucial for incumbent energy providers to build personnel resources dedicated to sustainability to meet the increasing requirements imposed by sustainability tools and measures, especially regarding the CSRD that is mandatory for 49,000 firms in the EU for the financial year of 2024. Alongside the necessary knowledge and expertise in applying these tools, sufficient personnel resources will be essential to handle the additional workload.

If an organization has only limited or no sustainability tools or systems in use yet, the first step should be to assess the current state of sustainability data collection. Conducting a so-called GAP-analysis is advisable to identify which sustainability data is already being measured and which data is missing. This analysis will help determine the relevant data that should be collected and guide the selection and implementation of appropriate Sustainability Management Tools.

In the mid-term and long-term, it is important to increase the knowledge and understanding of sustainability among employees. Organizations should take action to enhance employees' understanding of sustainability, particularly among those who actively use sustainability tools. This will ensure optimal utilization of various tools and facilitate their effective integration into day-to-day operations.

Creating appropriate governance structures is crucial for the long-term integration of sustainability instruments into existing systems. From the beginning, clear structures and responsibilities should be established to ensure that sustainability becomes increasingly embedded in existing processes and throughout all departments. This includes defining roles and responsibilities and fostering collaboration and communication among different stakeholders.

5.2 Implications for research

One of the crucial findings in the field of Sustainability Management Tools pertains to the significant disparity between theoretical frameworks and practical application. Thus, it is critical to say that there is a need for more investigations into the actual usage of Sustainability Management Tools in practice. In the literature, there is a focus on examining Sustainability Management Tools that are still relatively underutilized in practice, such as the Sustainability Balanced Scorecard for instance.

Many companies are not yet as far along in the process of implementing Sustainability Management Tools as the scientific community. As the field of Sustainability Management Tools continues to evolve rapidly, with the constant development of new tools, it becomes challenging to study and analyze individual tools comprehensively. Moreover, the introduction of new legal regulations, such as the CSRD, brings about substantial changes in the examination of Sustainability Tools. Therefore, it would be valuable for future research to concentrate on understanding the impact and effectiveness of these tools, especially in light of the latest regulatory requirements.

5.3 Limitations

The limitations of this thesis lie in the qualitative nature of the research conducted. The study used

a qualitative methodology, which inherently introduces subjectivity and potential bias. Consequently, the findings presented in the thesis represent the personal opinions and perspectives of the interviewees and their respective companies. For example, Interviewee 5 highlighted, "Pros and cons is always such a difficult question, because of course there are not always objective disadvantages with such systems". This statement reflects the subjective nature of the data collected.

In addition, the selection of interviewees and the influence of the EU Corporate Sustainability Reporting Directive (CSRD) have shaped the focus of this thesis, limiting its generalizability. The choice of interviewees and the specific context of the European Union have limited the scope of the research. As a result, the findings and conclusions presented in this thesis may not be applicable or validated for other regions or countries outside the EU. It is important to bear these limitations in mind when interpreting and applying the results of this study.

6 CONCLUSIO

This Master's thesis aimed to address the two research questions posed at the outset. The primary objective of the first research question was to elucidate the advantages and disadvantages of individual Sustainability Management Tools (SMTs), while the second research question sought to derive success factors for the use and implementation of these tools.

The conceptual framework served as the foundation, including elements such as strategic tools, sustainability, Sustainability Management Tools, a definition of success factors, and the energy sector. Subsequently, the applied grounded theory methodology and its three data sources, consisting of academic literature, grey literature and expert interviews, were examined in detail. In addition to the pre-defined selection criteria and a description of the methodological approach, this chapter presents the results of the systematic reviews and information on the experts interviewed.

In relation to the first research question, individual Sustainability Management Tools were categorized into Sustainability Reporting, Sustainability Assessment and Sustainability Management Control Tools. While the Global Reporting Initiative (GRI), as the most widely used sustainability reporting standard, promotes the advantage of comparability between companies, this is expected to be increasingly replaced by the requirements of the forthcoming CSRD, which will come into force in 2025. The GHG Protocol as a frequently used substandard, including the determination of Scope 1, 2 and 3 emissions, has also been examined. Sustainability Assessment Tools are often applied in practice to make strategic decisions or to use their results for other strategic tools. This category includes tools such as materiality analysis, gap analysis, risk assessment and life cycle assessment. Sustainability Management Control Tools typically target strategic objectives only and can generally be seen as an extension of classical Management Control Tools with a focus on sustainability. Examples of tools in this category include business planning, scenario analysis and benchmarking.

Regarding the second research question, several success factors were identified at the corporate, inter-organizational and individual levels. At the organizational level, critical success factors include the integration of SMTs into existing tools or systems, a clear structure of responsibilities and governance, the adaptation of tools to the organization’s context, and the commitment of the management board towards sustainability, demonstrated through actions such as upskilling

employees. At the inter-organizational level, success factors involve automated IT interfaces to minimize errors, various software-related advantages (such as multilingual capabilities), and factors such as the sustainability team's spirit of innovation and its collaboration with other departments. At the individual level, the commitment of the CEO as a role model, for instance, as well as the exemplary behavior of individual employees and their skills or commitment towards sustainability are crucial factors for the integration of sustainability in an organization.

In conclusion, the findings of this thesis contribute to the existing literature on Sustainability Management Tools and are particularly relevant for corporate practice. The identified research gap has been addressed and the two research questions have been answered.

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8 APPENDIX

8.1 Interview guide

8.1.1 Interview questions for sustainability managers

1. For starters, how would you define or describe the term "sustainability management tool" and how would you categorize these tools?
2. Description of categorization of Sustainability tools according to Maas et al.

	Transparency (External)	**Performance Improvement (Internal)**
Measurement	Assessment	Accounting
Management & Communication	Reporting	Communication & Control

3. What tools or systems are currently used for sustainability ***Assessment*** (to eventually report sustainability) and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools?
    b. What indicators (KPIs) are used and why?
    c. What do you think are the most important factors for these types of tools?

4. What tools are currently used for sustainability ***Reporting*** and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools (compared to others)?
    b. Which reporting standards or guidelines are used and why? What are advantages & disadvantages of these specific frameworks (compared to others)?
    c. What do you think are the most important factors for these types of tools?

5. What tools are currently used for sustainability ***Accounting*** and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools?
    b. How (based on which criteria) are goals and indicators (KPIs) selected?
    c. Which indicators are only used for the assessment as part of the reporting process and which to improve (internal) sustainability performance?
    d. How are these indicators reviewed and adjusted on an ongoing basis?
    e. Which tools are used to support the decision-making process (e.g. scenario analysis or forecasting capabilities)

f. Which tools are used to assess sustainability risks and opportunities?
g. What do you think are the most important factors for these types of tools (if not already mentioned)?

6. What tools are used for (internal) sustainability ***Communication & Control*** and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools?
    b. What do you think are the most important factors for these types of tools?

7. Which **(integrated) systems** (e.g. Environmental Management System) combining (some of) these types of tools are used and why? What are advantages & disadvantages of these system(s)?

8. What factors make the **success** of tools more likely **at different organizational levels (corporate/sub corporate/individual)**?
    i. Which of these tools are used by senior management / sustainability department / subdivisions / individuals?
    ii. Which of these tools are used on a more strategic level and which on an operational level?
    iii. Which of these tools and measurements provide quantifiable results, and which provide qualitative data?
    iv. Which of these tools are used online and which offline?

9. Additional questions:
    a. To what extent are stakeholders involved in the process of selecting and using various tools?
    b. Are there some tools that have been used in the past? And if yes, why are they not used anymore?

8.1.2 Interview questions for consultants

1. For starters, how would you define or describe the term "sustainability management tool" and how would you categorize these tools?
2. Description of categorization of Sustainability tools according to Maas et al.

	Transparency (External)	**Performance Improvement (Internal)**
Measurement	Assessment	Accounting
Management & Communication	Reporting	Communication & Control

3. Which tools would you recommend incumbent energy providers to use for sustainability ***Assessment*** (to eventually report sustainability) and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools?
    b. What indicators (KPIs) would you recommend using and why?
    c. What do you think are the most important factors for these types of tools?

4. Which tools would you recommend using for sustainability ***Reporting*** and why?
    a. Which tools or systems should be used for the generation of accurate and reliable reports? What are advantages & disadvantages in the implementation and usage of these specific tools (compared to others)?
    b. Which reporting standards or guidelines are relevant / obligated for key players in the energy sector and should therefore be used and why? What are advantages & disadvantages of these specific frameworks (compared to others)?
    c. What do you think are the most important factors for these types of tools?

5. Which tools would you recommend using for sustainability ***Accounting*** and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools?
    b. How (based on which criteria) should goals and indicators (KPIs) be selected?
    c. Which indicators should be used for the assessment only as part of the reporting process and which to improve (internal) sustainability performance?
    d. How should these indicators be reviewed and adjusted on an ongoing basis?
    e. Which tools should used to support the decision-making process (e.g. scenario analysis or forecasting capabilities)
    f. Which tools should be used to assess sustainability risks and opportunities?
    g. What do you think are the most important factors for these types of tools (if not

already mentioned)?

6. What tools would you recommend using for sustainability ***Communication & Control*** and why?
    a. What are advantages & disadvantages in the implementation and usage of these specific tools?
    b. What do you think are the most important factors for these types of tools?

7. Which **(integrated) systems** (e.g. Environmental Management System) combining (some of) these types of tools should be used and why? What are advantages & disadvantages of these system(s)?

8. What factors make the **success** of tools more likely **at different organizational levels (corporate/sub corporate/individual)**?
    i. Which of these tools should be used by senior management / sustainability department / subdivisions / individuals?
    ii. Which of these tools should be used on a more strategic level and which on an operational level?
    iii. Which of these tools and measurements provide quantifiable results, and which provide qualitative data?
    iv. Which of these tools are used online and which offline?

9. Additional questions:
    a. How would you consult an incumbent energy provider to involve stakeholders in the process of selecting and using various tools?