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Sustainability reporting in Finnish listed industrial companies

Current state analysis of large-scale companies in Basic Materials and Industrials sectors

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ABSTRACT:
Sustainability and sustainability reporting have been on growth over the last decade. Sustainability reporting is relevant for today's business, as stakeholders demand consistent and comparable information from companies on their sustainability performance. Reporting has long been voluntary, but regulation and directives have made it mandatory for several companies and this obligation is becoming more and more extensive with the CSRD Directive.

This study examines sustainability reporting in Finnish-listed industrial companies, the reporting frameworks they integrate, and the current state of reporting through seven topics of analysis. The study focuses on fourteen case companies, which are large, Finnish public limited companies and operate in the Basic Materials or Industrials sector according to Nasdaq classification. The data consists of sustainability reports published by the case companies either as a stand-alone report or as part of their annual report. The analysis of the study also aims to identify similarities and differences between companies' sustainability reporting and whether the reports are comparable.

The results of the research show that companies have published their sustainability information and that it is more common to publish the information as part of an annual report. All case companies have published their sustainability information by implementing GRI standards. Other more common frameworks have also been implemented by the case companies in their reporting or they mention publishing their information elsewhere. Among the seven topics under analysis of the current state, companies exhibit more differences. For some of the aspects analyzed, not every company provides information on their sustainability data, but in general, sustainability reporting by case companies is comprehensive.

The results of the research also show that there are differences in the presentation of information, both in terms of presentation and content. The results show that the reports are not comparable as the case companies have published their data in different ways, including the use of various calculation methods. However, in general, compared to previous research, case companies have reported their sustainability performance better than the international average of N100 companies. In the future, the quality and comparability of sustainability reporting can be expected to improve as a result of regulations, directives, and standards.

KEYWORDS: sustainability reporting, sustainable development, Sustainable Development Goals, Global Reporting Initiative, Paris agreement on climate change

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TIIVISTELMÄ:
Kestävä kehitys ja kestävyystietojen raportointi ovat olleet kasvussa viimeisen vuosikymmenen aikana. Kestävyysraportointi on nykypäivän liiketoiminnan kannalta olennaista, sillä sidosryhmät vaativat yrityksiltä johdonmukaisia ja vertailukelpoisia tietoja kestävän kehityksen suorituskyvystä. Raportointi on pitkään perustunut vapaaehtoisuuteen, mutta sääntely ja direktiivit ovat tehneet siitä velvoittavia useille yrityksille ja velvoite laajenee yhä lisää CSRD didektiivin myötä.

Tässä tutkimuksessa tutkitaan suomalaisten teollisuuden pörssiyritysten kestävyysraportointia, heidän integroimia raportoinnin viitekehyksiä ja raportoinnin nykytilaa seitsemän analysoitavan kohdan avulla. Tutkimuksessa keskitytään neljääntoista case yritykseen, jotka ovat kooltaan suuria, suomalaisia julkisia osakeyhtiöitä ja toimivat Basic Materials tai Industrials sektorilla Nasdaqin luokituksen mukaan. Tutkimuksen aineisto koostuu case yritysten julkaisemista kestävyysraporteista joko erillisenä raporttina tai osana vuosikertomusta. Tutkimuksen analyysin tarkoituksena on myös selvittää yritysten kestävyysraportoinnin välisiä samankaltaisuuksia, eroavaisuuksia ja ovatko raportit vertailukelpoisi keskenään.

Tutkimuksen tulosten mukaan yritykset ovat julkaisseet kestävyystietonsa ja yleisempää on julkaista tiedot osana vuosikertomusta. Kaikki case yritykset ovat julkaiseet kestävyystietonsa implementoiden GRI standardeja. Myös muita yleisimpiä viitekehyksiä ovat case yritykset implementoineet raportointiinsa tai mainitsevat julkaisevansa niiden tiedot muualla. Nykytilan seitsemän analysoitavan kohdan välillä yrityksillä on enemmän eroavaisuuksia. Osaan analysoitavista kohdista ei löydy tietoja jokaiselta yritykseltä heidän kestävyystiedoistaan, mutta pääsääntöisesti case yritysten kestävyysraportointi on kattavaa.

Tutkimuksen tulokset osoittavat lisäksi, että raportoinnista löytyy eroavaisuuksia tietojen esittämisessä niin esitystavan kuin myös sisällön osalta. Tulosten mukaan raportit eivät ole keskenään vertailukelpoisia sillä case yritykset ovat julkaiseet tietojaan eri tavalla käyttäen muun muassa erilaisia laskennallisia menetelmiä. Kuitenkin yleisesti case yritykset ovat aiempaa tutkimusta nähden raportoineet kestävyydestään kansainvälisesti N100 yritysten keskiarvoa paremmin. Tulevaisuudessa voidaan odottaa kestävyysraportoinnin laadun ja vertailukelposuuden parantuvan sääntelyn, direktiivien ja standardien myötä.

AVAINSANAT: kestävyysraportointi, kestävä kehitys, kestävän kehityksen tavoitteet, Global Reporting Initiative, Pariisin ilmastosopimus

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Abbreviations

CDP	**Carbon Disclosure Project**
CSDDD	**Corporate Sustainability Due Diligence Directive**
CSR	**Corporate Social Responsibility**
CSRD	**Corporate Sustainability Reporting Directive**
ESG	**Environmental Social Governance**
EU	**European Union**
GHG	**Greenhouse gas**
GRI	**Global Reporting Initiative**
IFRS	**International Financial Reporting Standards**
ISO	**International Organization for Standardization**
ISSB	**International Sustainability Standards Board**
MCSI	**Morgan Stanley Capital International**
NFRD	**Non-Financial Reporting Directive**
SASB	**Sustainability Accounting Standards Board**
SBT	**Science Based Targets**
SDG	**Sustainable Development Goals**
SFDR	**Sustainable Finance Disclosure Regulation**
TBL	**Triple Bottom Line**
TCFD	**Task Force on Climate-related Financial Disclosures**
UN	**United Nations**
UNGC	**United Nations Global Compact**

1 Introduction

This chapter provides background information on this study, the research gap, the research objective and research questions, the study's scope, and the study's structure. The background of the study introduces the topic of sustainability reporting, the research gap describes what this study brings in comparison to previous research, and the research question and objective describe what this study will answer. The research structure section opens up the structure of the research and the sections into which this research is divided.

1.1 Research background and research gap

Corporate responsibility and sustainable development have been trending terms over the past 10 years. But these concepts have been around for much longer. The term corporate social responsibility (CSR) has been used as such since 1953 when Bowen first proposed the concept (Bowen, 1953). The definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs was defined as early as 1987 in the Brundtland Report. (World Commission on Environment and Development, 1987).

Over the years, especially in the 2010s, more and more work on climate change and sustainable development has been done and more and more agreements have been reached to secure the future of the planet for future generations. One of these is the Paris Climate Agreement, which was signed in 2015 and entered into force in 2016 (Ministry of the Environment, n.d. -a). The Paris Climate Agreement is an international and legally binding agreement on climate change and aims to prevent the global average temperature from rising by two degrees compared to pre-industrial times (Ministry of the Environment, n.d. -a). In addition, in 2015, the United Nations adopted the 2030 Agenda, which aims to encompass peace and prosperity for all humanity and the planet, now and in the future (Ministry for Foreign Affairs of Finland, n.d.). The 2030 Agenda

includes 17 Sustainable Development Goals (SDGs) to be achieved by 2030 (Ministery for Foreign Affairs of Finland, n.d.).

According to a KPMG study, in 1993, 12% of the 100 largest companies in 52 countries reported sustainability and by 2020 this number would rise to 80% (KPMG, 2020). In 1997, 35% of the 250 largest companies in the world by turnover on the Fortune 500 list reported sustainability and by 2020 this figure had risen to 96% (KPMG, 2020). The large increase in sustainability reporting has been driven by the change in sustainability reporting legislation to make it equally mandatory. In 2016, the Ministry of Economic Affairs and Employment of Finland (n.d.) adopted a legislative amendment based on an EU directive that requires certain types of companies to report on their corporate social responsibility. In this case, the reporting obligation was defined to apply to large companies of public interest, i.e. listed companies, credit institutions, and insurance companies with more than 500 employees during the financial year, a turnover of more than EUR 40 million, or a balance sheet of more than EUR 20 million.

The reporting obligation will also be extended in the future with the EU's Corporate Sustainability Reporting Directive. According to Lindman (2023), from 2024 the reporting obligation will apply to all large companies with more than 500 employees operating in EU-regulated markets. Lindman adds that this mandatory reporting will start in 2025 and that more and more companies will be subject to reporting each year.

Sustainability reporting is a tool for a company to disclose information about the impact of its activities on society and the environment, through economic, social, and governance (ESG) (Artiach et al., 2010). According to Hijjawi and others (2021), sustainability reporting allows a company to influence public opinion and improve its reputation. According to Brockett and Rezaee (2012) investing in non-financial sustainability reporting can have a positive impact on a company's reputation while minimizing negative side effects. They add that companies need to invest capital to reduce pollution and conserve energy, but stress that these actions will reduce

environmental debt in the long run. While actions related to social issues may reduce companies' profits in the short term, they are believed to create and enable higher profits in the long term by enabling the right working environment (Daub, 2007).

Previous studies have shown the relationship between reputation and sustainability and increasingly, sustainability efforts appear to be a prerequisite for a company's reputation and success in improving acceptance by stakeholders, investors, and customers (Gomez-Trujillo et al., 2020). ESG information provided by companies is essential for today's business and investors demand consistent and comparable information from companies on their sustainability performance (KPMG, 2022a). In a Bloomberg research, Nadia Humphreys says that quality and comparability are global challenges in publishing ESG data (Bloomberg, 2024). The same is said by Janine Guillot who says that finding comparability and consistency among voluntary ESG reporting frameworks and standards is challenging (KPMG, 2022a).

Research shows that sustainability reporting has increased significantly over the last 30 years and by 2020, 80% of the top 100 companies will report their sustainability data (KPMG, 2020). According to KPMG's "Survey of Sustainability Reporting 2020", Finland is better than the average country in reporting sustainability data with 90% coverage, compared to an average of 77%. In the 2022 survey, Finland raised its percentage to 94% (KPMG, 2022a). In the 2022 survey, Japan, Singapore, the United States, and Germany reached 100%. Previous research has identified 2020 trends in sustainability reporting: risks, emissions reductions, and the UN Sustainable Development Goals (SDGs) in business (KPMG, 2020). In 2022, sustainability reporting trends include: the use of standards framed by stakeholder materiality assessments, increased reporting on climate-related risks and carbon reduction targets using the TCFD framework, awareness of biodiversity risk, and UN SDG reporting prioritizes quantity over quality (KPMG, 2022a).

Previous research shows that companies have identified their highest ESG data priority as regulatory requirements (35%) and climate risk and net solutions (18%) (Bloomberg, 2024). However, according to a Bloomberg (2024) survey, the biggest ESG data challenge companies identify is data coverage and quality issues with ESG-reported data (63%). Nadia Humphreys that in the future, data management of ESG data will also be a growing challenge for companies (Bloomberg, 2024). The number of sustainability reporting and sustainability data publications is expected to increase with the new directives, which is expected to increase the amount of ESG data reported and the quality of that data.

This information provides an overview of the global situation, but the studies have not looked at Finnish large-cap industrial companies and the current state of their sustainability reporting. This study aims to investigate the current state of sustainability reporting by large Finnish-listed industrial companies operating in the Basic Materials or Industrial sector according to Nasdaq classification, which frameworks are used. The research will also investigate whether there are differences and similarities in reporting between companies and examine the comparability of sustainability reporting between companies.

1.2 Research problem, questions, and objectives

Sustainability reporting has been the trend for some years due to sustainability reporting requirements as well as growing awareness among customers, investors, and stakeholders. Sustainability reporting is also becoming increasingly mandatory, as the EU Corporate Sustainability Reporting Directive will make sustainability reporting mandatory for more and more companies in the future (Kuparinen, 2023).

The purpose of this study is to examine the current state of sustainability reporting in large Finnish-listed companies operating in the Basic Materials or Industrials sector according to the Nasdaq classification. This study examines the sustainability reporting frameworks used by the companies and explores what the United Nations Sustainable

Development Goals (UN SDGs) are being pursued by the companies. In addition, the study examines the themes that companies have identified as material, the Greenhouse Gas (GHG) emissions in each of the scope 1,2,3 categories, the business risks associated with climate change, and what sustainability goals companies set for themselves. In addition, the coverage of the ISO 14001 standard and how the selected companies have performed in the different ESG assessments will be investigated.

The research method used in this study is qualitative research and, more specifically, qualitative content analysis. This research is also a case study. The data for the study consists of sustainability reports from 14 different companies for the year 2022, which are available on the company's website either as a stand-alone sustainability report or as part of their annual report. This study aims to answer the following research questions:

1. How large Finnish listed companies in the Basic Materials or Industrials sector implement sustainability reporting and which frameworks do they adopt?
2. What is the current state of sustainability reporting among large Finnish listed companies in the Basic Materials or Industrials sector?

The first question aims to answer how companies report and what frameworks they use for sustainability reporting and which international agreements, initiatives they mention they follow in their reporting. The second question analyzes more at the analysis of the current state of sustainability reporting according to the analytical framework defined in the methodology section.

1.3 Structure of the research

This study is structured into five chapters: Introduction, Theoretical framework, Research methodology, Research Findings and discussion, and finally, the Conclusion. The research begins with an introduction that introduces the topic, why the topic is chosen, what the aim of the study is, and what research questions this paper aims to

answer. Next is the theoretical framework of the research, which discusses the theoretical contribution of the study, that is the background of sustainability and sustainability reporting, sustainability reporting frameworks, standards, directives, and ratings. The theoretical framework is created using previous studies, theories, and international agreements and directives.

This is followed by the methodology section of the research, which reviews the methodology used in the research, the data collection and analysis, and the case companies used in the research. The research findings and discussion section presents the answers to the research questions and discusses the results based on theory and previous research. Finally, the conclusion summarises the research, presents managerial implications, and discusses the reliability of the research, its limitations, and how the results could be used in future research.

2 Theoretical framework

This chapter discusses the theoretical framework of the study. This chapter is divided into three parts, which are the background of sustainability, sustainability reporting, and ESG assessments. The first part presents the background to sustainability, reviewing the international agreements and standards related to sustainability, and the UN Sustainable Development Goals (SDGs) to which companies also report on their responsibility. The second part discusses sustainability reporting and its legislation and directives, as well as more general frameworks for sustainability reporting. This section discusses the sustainability reporting directives, materiality, and reporting frameworks such as SASB, GRI, and TFCD. The final section discusses the sustainability assessments that companies can receive for their sustainability performance.

2.1 Sustainability background

The concept of sustainability has its origins in the forest industry, where the concept was formed by the idea of not cutting more wood from the forest than it produces new growth (Wiersum, 1995). Sustainability received worldwide attention when the Club of Rome report predicted that important natural resources would be depleted within the next one or two generations (Boloña, 1973). As a consequence, the UN report on the environment was well received as it provided solutions to the problem of future resource depletion (Kuhlman & Farrington, 2010). As a result, the terms sustainability and sustainable development have become established (Kuhlman & Farrington, 2010). Brundtland, then UN President, and his colleagues defined sustainable development in this way:

> Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

In the Brundtland report, the sustainability concern is seen from two perspectives, which are development and the environment (Kuhlman & Farrington, 2010). However, nowadays sustainability is seen as three dimensions which are social, economic, and environmental (Helming et al., 2008; Kates et al., 2005). This is also evident from the Agenda of Development published by the UN in 1997, which has defined sustainability as follows:

> Development is a multidimensional undertaking to achieve a higher quality of life for all people. Economic development, social development, and environmental protection are interdependent and mutually reinforcing components of sustainable development (United Nations, 1997).

The idea of three dimensions of sustainability goes back to the Triple Bottom Line concept developed by Elkington in 1994 (Kuhlman & Farrington, 2010). As the name implies, the Triple Bottom Line (TBL) includes three pillars (Khan et al., 2021). According to Jonker (2023), TBL's three pillars are people, planet, and profit. Financial sustainability aims to secure profits and secure liquidity (Schulz & Flanigan, 2016). Social sustainability aims to create humane and equal social development, and environmental sustainability, on the other hand, secures the sustainability of the consumption of natural resources and the impact of human activities on the environment (Hubbard, 2009; Norman & MacDonald, 2004).

Today, these three pillars are better known as economic, environmental, and social. In this model, "economic sustainability" focuses on the sustainable use of natural resources for economic purposes. "environmental sustainability" means the protection of the earth and life-sustaining systems such as the atmosphere or soil. "Social sustainability" focuses on human impacts such as eliminating poverty, hunger, and inequality. Figure 1 shows the model of each of the 3 pillars and how their three different areas together form sustainability.

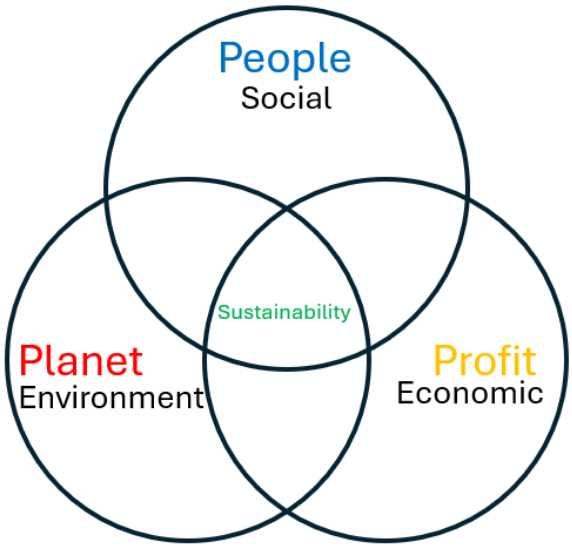


Figure 1 Three pilars of sustainability

2.1.1 ESG – Environment Social Governance

The concept of Environment Social Governance (ESG) started to emerge in the early 2000s, although ESG-related activities existed for decades before that. Many issues, such as improving working conditions during the Industrial Revolution and funding repressive governments, have been actions in the "S" and "G" categories. (Byrne, n.d.). ESG in its current form was first mentioned in a United Nations report published in 2004. The United Nations report at the time encouraged everyone to take ESG issues into account in the long term (Global Compact, 2004). At the same time, the same themes were receiving increasing international attention, and sustainability and social respect for others were becoming a growing theme (Byrne, n.d.).

Global Compact (2004) identifies tasks in their report for each sector that should be considered in the future in terms of ESG. For example, the report states that companies should adopt ESG principles and reporting and disclosure. NGOs should provide information on ESG issues to businesses and the public, as well as to the financial

community. Investors should take ESG issues into account and education should focus on ESG thinking and issues. Global Compact (2004) report also identified tasks for other actors concerning ESG, however, all these activities are aimed at achieving common objectives, which the report identified as follows:

- Stronger and more resilient financial markets
- Contribution to sustainable development
- Awareness and mutual understanding of involved stakeholders
- Improved trust in financial institutions

2.1.2 United Nations Global Compact

The UN Global Compact (UNGC) is the largest global voluntary initiative on corporate social and environmental responsibility (Voegtlin & Pless, 2014). The UNGC aims to make companies and organizations take responsibility for sustainable development and the future of the planet voluntarily (Global Compact Network Finland, n.d.). According to Voegtlin and Pless the UNGC was established in 2000 at the initiative of then UN General Secretary Kofi Annan's speech at the Economic Forum in 1999. The UNGC provides companies with a framework for responsibility and UNGC contains ten principles to improve human rights, labor, environment, and the fight against corruption. UN Global Compact (n.d.) ten principles are:

1. Businesses should support and respect the protection of internationally proclaimed human rights
2. Make sure that they are not complicit in human rights abuses
3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining
4. The elimination of all forms of forced and compulsory labor
5. The effective abolition of child labor

6. The elimination of discrimination in respect of employment and occupation
7. Businesses should support a precautionary approach to environmental challenges
8. Undertake initiatives to promote greater environmental responsibility
9. Encourage the development and diffusion of environmentally friendly technologies
10. Businesses should work against corruption in all its forms, including extortion and bribery

Companies and organizations that commit to the initiative commit to the ten principles in all countries where they operate (Global Compact Network Finland, n.d.). The UN Global Compact also provides support and training for companies to achieve more responsible business practices. According to Global Compact Network Finland (n.d), more than 20,000 companies and over 3,000 other organizations worldwide in more than 160 countries are involved in the UNGC. According to (Voegtlin & Pless, 2014) UNGC has played a major role in promoting corporate social responsibility. Post (2013) has said that "the United Nations Global Compact is an important milestone in the history of global corporate social responsibility".

2.1.3 Paris Climate Agreement

The Paris Climate Agreement is an international climate change agreement that aims to prevent the global average temperature from rising (Ministry of the Environment, n.d. -a). The Finnish Ministry of the Environment adds that The Paris Agreement aims to keep the global average temperature increase to well below 2 degrees Celsius and to take steps to limit the increase to less than 1.5 degrees Celsius. The baseline is the global temperature relative to pre-industrial times. The agreement was signed on 12 December 2015 and entered effect on 4 November 2016. The agreement complements the 1992 UN agreement on climate change (Ministry of the Environment, n.d. -a).

To avoid or limit the increase in global average temperatures, the Paris Climate Agreement aims to reduce global greenhouse gas emissions within a short timeframe (Ministry of the Environment, n.d. -a). According to the Finnish Ministry of the Environment, the Paris Agreement aims to achieve a balance between anthropogenic greenhouse gas emissions and carbon sinks that absorb emissions by the end of this century. The Paris Agreement does not itself contain an emission reduction commitment, but the parties to the commitment undertake to prepare, communicate, maintain, and meet their national emission targets. However, the parties to the Paris Climate Agreement have an obligation to prepare a national goal every five years, and the new goal must always be more ambitious than before. According to KPMG's Sustainability Reporting Survey, 54% of global N100 companies have linked their climate goals to the Paris Climate Agreement (KPMG, 2022a).

2.1.4 Agenda 2030 and UN Sustainable Development Goals

In 2015, the United Nations decided to adopt the 2030 Agenda for Sustainable Development, which aims to encompass peace and prosperity for all humanity and the planet, now and in the future (Ministry for Foreign Affairs of Finland, n.d.). The 2030 Agenda contains 17 Sustainable Development Goals (SDGs), with 167 sub-goals underneath. The 2030 Agenda aims to achieve sustainable development in all three of its sectors: economic, human well-being (social), and environmental. As the name suggests, the Sustainable Development Goals should be met by 2030 (Ministry for Foreign Affairs of Finland, n.d.). The SDGs have a commonly used set of symbols, and these are often used when the goals are mentioned. Figure 2 shows all 17 UN SDGs and their commonly used design.

Figure 2 UN Sustainable Development Goals (Sustainable Development Goals, n.d.)

According to (Szennay et al., 2019) the SDGs can be divided into three different categories. In addition to the three categories, the last goal, number 17, aims at promoting the goals together and not leaving anyone alone (Ministry for Foreign Affairs of Finland, n.d.). The three categories are shown in table 1.

Table 1 UN SDG categories

Biosphere	Society	Economy
6, Clean Water and Sanitation 13, Climate Action 14, Life Below Water 15, Life On Land	1, No Poverty 2, Zero Hunger 3, Good Health and Well-Being 4, Quality Education 5, Gender Equality 7, Affordable and Clean Energy 11, Sustainable Cities and Communities 16, Peace and Justice, Strong Institutions	8, Decent Work and Economic Growth 9, Industry, Innovation, and Infrastructure 10, Reduced Inequality 12, Responsible Consumption and Production 17: Partnerships to Achieve the Goal

According to Delgado-Ceballos and others (2023), Agenda 2030 and the EU Sustainable Development Goals were originally set to be promoted at the society and country levels, and thus the role of companies has remained unclear. However, this is a false assumption, as companies have a significant role and responsibility in promoting sustainable development worldwide (Montiel et al., 2021). Montiel and others add that companies should enhance their role and responsibility in the fight against climate change as they are also contributing to negative externalities in society and nature through their actions.

In addition, companies have the resources, expertise, and capacity to pursue the SDGs by 2030 (Delgado-Ceballos et al., 2023). According to Delgado-Ceballos and others (2023), there is a growing need to understand how companies can integrate the EU SDG framework into their operations. Thus, changes can be made in business practices to promote global sustainability. According to a KPMG (2022a) survey research, 71% of the global N100 companies included the UN's sustainable development goals in their reporting. 10% of the companies mentioned that they report on all 17 SDG goals and the remaining companies chose specific goals (KPMG, 2022a). The research shows that the most popular SDGs are Decent Work and Economic Growth (72%), 13: Climate Action (63%), and 12: Responsible Consumption and Production (58%). Less prioritized SDGs are 2: Zero Hunger (22%), 14: Life below Water (18%), and 15: Life on Land (9%).

2.1.5 Green Deal

The Green Deal is Europe's green development agreement which aims to achieve zero net greenhouse gas emissions in Europe by 2050 (European Commission, n.d. -a.). According to Szpilko and Ejdys (2022), several studies have shown that the transition towards a climate-neutral future and economy is one of the most significant challenges for current and future generations. Szpilko and Ejdys also add that the main goal of the Green Deal is to put sustainability and people's well-being at the center of both economic policy and the basis of all political decisions. In addition, the aim is to separate economic growth from the use of resources and to pursue development without leaving

any people or any region behind (European Commission, n.d. -a.). To achieve this goal, the EU Commission has adopted a reform for the EU's climate, energy, transport, and tax policies that will support the reduction of net greenhouse gas emissions. This proposal aims to reduce emissions by 55% by 2030. The benchmark for reductions will be 1990 emission levels (European Commission, n.d. -a.).

According to the Ministry of the Environment (n.d. -b), Green Deal agreements are part of the Society's Commitment to Sustainable Development introduced by the Finnish National Commission on Sustainable Development. In Finland, companies and public actors are committed to promoting the goals following the agreements.

2.1.6 EU Corporate Sustainability Due Diligence Directive

The European Commission (n.d. -b.) adopted a proposal in February 2022 for the directive's due diligence obligations for companies. The aim of the EU Corporate Sustainability Due Diligence Directive (CSDDD) is to promote the principles of sustainable development and responsibility, including human rights and environmental issues in the operations and ownership management of companies. This is aimed at verifying sustainable development actions and better addressing harmful effects both in Europe and outside of the entire company's value chain.

The Corporate Sustainability Due Diligence Directive obliges companies to take action to promote environmental protection and human rights (KPMG, n.d.). The Directive requires companies to identify and address negative environmental impacts and human rights abuses caused by their activities. The Directive would oblige companies not only in their operations but also throughout the value chain for those entities with which they have direct and indirect established business relationships, as well as in their subsidiaries (KPMG, n.d.). The Directive would require companies to have an action plan and would also require companies to draw up a preventive action plan for their direct business partners. To this end, companies would have to carry out a thorough analysis of their

business activities and their relationship and impact, to identify all potential risks and negative impacts of their activities as a result of their operations and processes. It is currently estimated that the CSDDD will probably not enter into force until 2025 at the earliest (KPMG, n.d.).

2.1.7 Science Based Targets

Science Based Targets (SBT) is an initiative of a climate action organization that aims to tackle the climate crisis through science-based targets (Science Based Targets, n.d.). SBT provides companies with standards, tools, and guidelines to help them set greenhouse gas emission reduction targets for their operations. These emission reductions would aim to stop climate change and keep global warming below catastrophic levels. To achieve this, greenhouse gas emissions should be reduced by 50% by 2030 and reach net-zero emissions by 2050 (Science Based Targets, n.d.).

According to SBT, climate science studies warn that global warming must be curbed to avoid catastrophic impacts. Science-based targets give companies a direction on how fast they should reduce their emissions to mitigate climate change and meet global climate targets. SBT works in partnership with CDP, the United Nations Global Compact, the We Mean Business Coalition, the World Resources Institute (WRI), and the World Wide Fund for Nature (WWF), among others (Science Based Targets, n.d.).

According to KPMG's (2022a) research, 71% of the global N100 companies have announced their own climate goals. The research clearly shows how the setting of climate targets has increased from 2017 onwards. The majority (54%) of the companies in KPMG's research combine their targets with the targets set by the Paris Climate Agreement to keep global warming below 2 celsius degrees compared to pre-industrial times.

2.1.8 Greenhouse gas emissions

Greenhouse gases are gases in the atmosphere that let in solar radiation but absorb thermal radiation from the Earth's ground (Sitra, n.d.). Greenhouse gases include water vapor, carbon dioxide, methane, tropospheric ozone, nitrous oxide, and fluorinated greenhouse gases (Sitra, n.d.). These contribute to the greenhouse effect, and the increase in emissions exacerbates the phenomenon, leading to climate change.

Several agreements, commitments, and targets aim to achieve carbon neutrality, reduce emissions, and prevent global warming. The Paris Climate Agreement aims to reduce anthropogenic greenhouse gas emissions and balance emissions in relation to the capacity of carbon sinks to sequester emissions. The EU's Green Deal agreement and the EU's climate policy have set the goal of zero greenhouse gas emissions in Europe by 2050 (Ministry of the Environment, n.d. -c). The goal of the Green Deal and the EU's climate policy is also to reduce emissions by 55% by 2030 from the 1990 level (Ministry of the Environment, n.d. -c).

To start taking action to reduce greenhouse gas emissions, companies must first identify their emissions. According to the Greenhouse Gas (GHG) Protocol, business emissions are divided into three categories (NGS Finland, 2023). These are scope 1, 2 and 3. This makes it possible to separate the direct emissions from the company's activities from indirect emissions, which are generated from the production of energy used in other ways and from other emissions generated in the value chain. Scope 3 emissions are further subdivided into upstream and downstream categories describing emissions before production (upstream) and emissions after production (downstream) (NGS Finland, 2023). Figure 3 shows how Scope 1, 2, and 3 are distributed in the company's value chain and what emissions belong to each scope category.

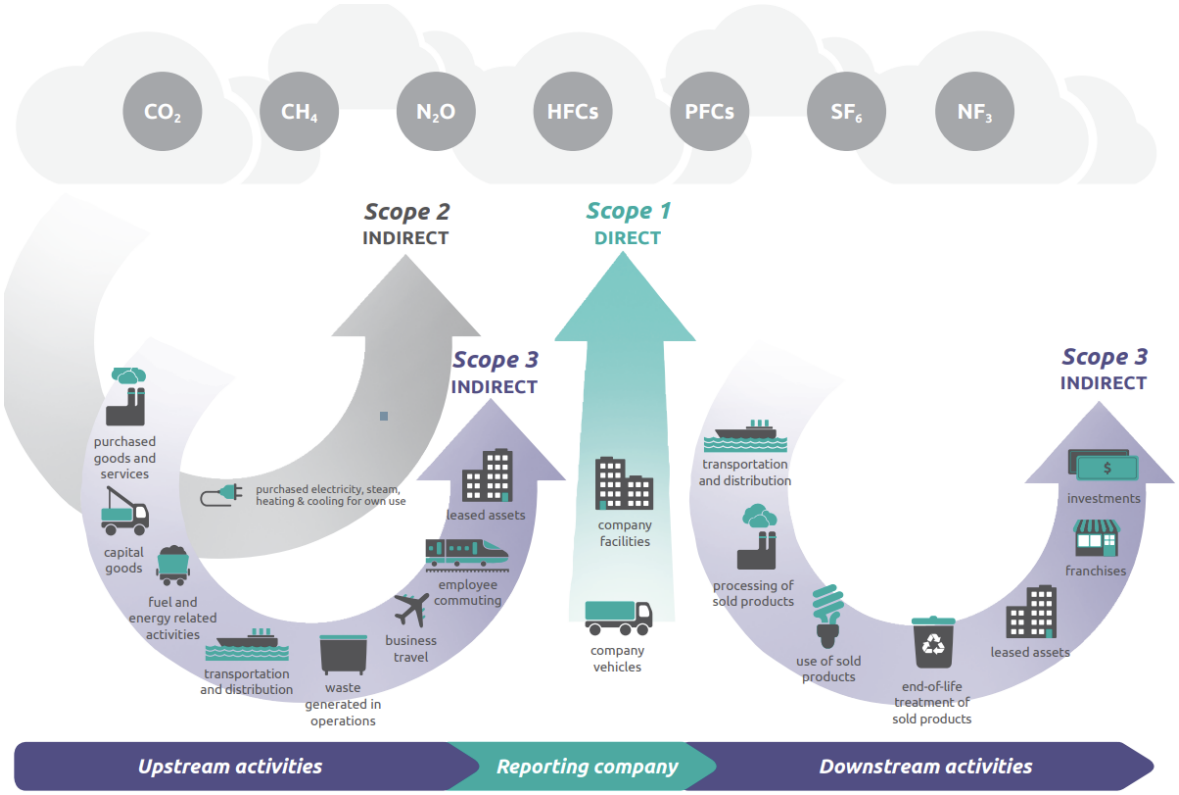


Figure 3 Overview of GHG Protocol scopes and emissions across the value chain (Greenhouse Gas Protocol, 2013).

Scope 1 – emissions are those that the company has a direct impact on and can more easily control through its actions. Emissions occur on-site, for example in an industrial plant, as a result of the company's activities. These emissions might include fuel emissions from vehicles used in production, emissions from the combustion of fuels, and emissions from the manufacture and handling of materials and chemicals. (NGS Finland, 2023).

Scope 2 – emissions are the indirect emissions from a company's activities. These include emissions from the production of energy purchased from outside sources. This energy is used by the company to provide electricity and heating for its operations. Taking scope 2 emissions into account is important because globally almost 40% of greenhouse gas emissions are generated from energy production. (NGS Finland, 2023).

Scope 3 – emissions include all other indirect emissions related to the end use of sold products and the procurement of goods and services. Scope 3 emissions are categorized into upstream and downstream emissions. Upstream emissions include purchased products and raw materials, capital goods such as equipment and machinery, pre-production logistics, waste and wastewater, and business travel emissions. Downstream emissions include post-production logistics, processing, use, and disposal of sold products. Scope 3 emissions identification in a company's operations will increase companies' understanding of their value chain's greenhouse gas emissions and thus enable them to take action to manage and control emissions and risks. (NGS Finland, 2023).

2.1.9 ISO 14001

ISO 14001 is part of the ISO 14000 series of environmental management standards. ISO 14001 environmental management systems (EMS) is the only ISO 14000 standard that can be certified (International Organization for Standardization, n.d.). The ISO 14000 series of standards provides tools for environmental management and improvement. By using the standards, an organization can also increase its financial benefits (SFS Suomen Standardit, n.d.).

According to SFS Suomen Standardit (n.d.), ISO 14001 is the world's best-known tool for integrated environmental management. It enables organizations of any size, in any industry, to improve their environmental management in a comprehensive and goal-oriented way, while contributing to sustainable development and its objectives. To enable an organization to improve its environmental performance and sustainable development, ISO 14001 defines the resources, processes, and methods that enable organizations to achieve their environmental objectives (SFS Suomen Standardit, n.d.). SFS Finland Standards adds that the standard considers all activities of an organization that have an impact on the environment. These may include air pollution, water use, raw

material use, energy use, waste management, soil contamination, and efficient use of other resources.

ISO 14001 is based on PDCA (plan, do, check, act) which aims to plan, manage, measure, and improve activities systematically (SFS Suomen Standardit, n.d.). ISO 14001 is the foundation for other environmental management tools such as environmental audits and life cycle assessments. According to SFS Suomen Standardit (n.d.), the benefits of ISO 14001 for an organization are as follows:

- To combine environmental issues as part of the organization's strategy and operational planning.
- To demonstrate compliance with statutory requirements and other binding obligations
- To increase management commitment and staff participation
- To improve the management of environmental risks and to secure the continuity of operations.
- To demonstrate responsibility in the management of environmental issues to stakeholders, such as customers, partners, authorities, and financiers
- To improve competitiveness by developing resource efficiency and cutting costs
- To improve the consideration of environmental impacts in all stages of product and service chains
- To develop environmental communication and corporate image.

According to (Tarí et al., 2012), several studies have found that the ISO 14001 standard brings benefits to an organization, particularly in the areas of environmental performance, efficiency, and profitability. In addition, Tarí and others have listed improved image, improved customer satisfaction, improved staff results, improved competitive edge, and improved relations with stakeholders among the benefits of ISO 14001. Hillary (2004) has presented the benefits of ISO 14001, dividing them into

internal and external benefits. And then further into categories. Figure 4 shows Hillary's findings on the benefits of the standard, broken down into internal and external benefits and then into categories.

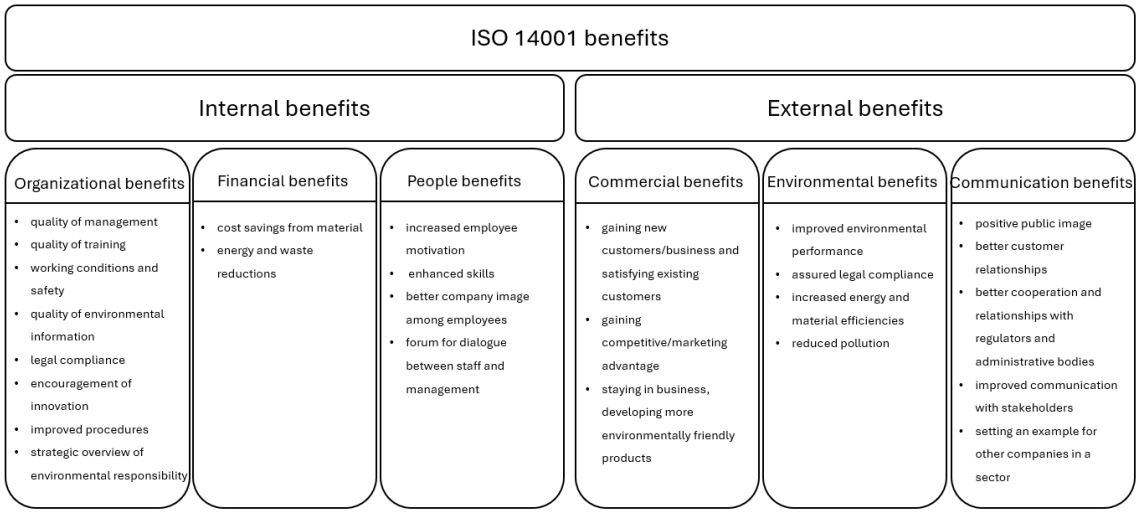


Figure 4 ISO 14001 benefits (Hillary, 2004).

The number of ISO 14001 certifications has increased every year (da Fonseca, 2015). According to the ISO Survey of Management System Standard Certifications 2022 survey, there are 1740 ISO 14001 certificates in Finland (International Organization for Standardization, 2024). ISO standards are reviewed every five years to ensure that they remain up-to-date and relevant to the market. (da Fonseca, 2015).

2.2 Sustainability reporting

Sustainability reporting has become increasingly mandatory for most companies as a result of directives and legislation, but it is also important for a company's reputation and success. In particular, the Paris Climate Agreement and the UN's Sustainable Development Goals (SDGs) have been seen as a turning point in awareness of sustainability and climate change work (Hummel & Jobst, 2024). In KPMG's (2022) study, Janine Guillot says that today's investors demand consistent and comparable

sustainability information from companies and that ESG information is essential for today's business. However, she adds that finding consistency and comparability in the reports has proven to be a challenge. Hummel and Jobst (2024) see that the rapid evolution of sustainability reporting and changes in the EU and the number of targets and requirements have also made it difficult for organizations as well as researchers to keep following changes in sustainability reporting standards and legislation. (Stolowy and Paugam (2023) in their study on the future of sustainability found inconsistencies between standard setters and companies. Baboukardos et al. (2023) in their study have identified a "multiverse" of sustainability reporting which in their study makes it difficult to keep abreast of changes and requirements in sustainability reporting.

According to KPMG's sustainability reporting survey, 79% of the N100 companies globally report their sustainability data. In Finland, this figure rises to 94%. Internationally, Germany, Japan, Singapore, and the United States reach 100% (KPMG, 2022a). The KPMG study identifies the use of standards based on stakeholder materiality assessments, the increasing reporting of climate-related risks and carbon emissions, biodiversity risk awareness, and UN SDGs as current sustainability reporting trends.

According to economics-based theory, companies will voluntarily disclose their information if the benefits exceed the costs (Verrecchia, 1983). Leuz and Wysocki (2016) argue that corporate disclosure reduces information asymmetry between firm managers, investors, and shareholders. They also add this reduces estimation risk and increases market liquidity. On the other hand, Healy and Palepu (2001) argue that voluntary disclosure also has an impact on capital markets, for example in the form of lower cost of capital. Thus, firms have had an incentive to disclose their sustainability data until the marginal benefit exceeds the costs of reporting. Costs of sustainability reporting include, among others, the preparation of the report, certifications, noncompliance, and indirect negative impacts of disclosure of proprietary information. On the other hand, legitimacy theory is seen as another theory for voluntary corporate sustainability reporting. Legitimacy refers to the generalized perception that some actions are desirable and

appropriate or within the framework of some norms and values. According to legitimacy theory, companies provide voluntary information about their sustainability to improve and correct their legitimacy (O'Donovan, 2002).

According to (Hummel & Jobst, 2024) several studies have shown that companies with low sustainability performance have provided positive sustainability information to influence public perceptions of the correct sustainability performance. Such behavior, where negative issues are hidden behind positive sustainability reporting, is called greenwashing (Christensen et al., 2021). This is why sustainability reporting commissions are needed to make sustainability reporting a tool for transparency and reliability (Patten, 2014). Patten adds that with clearly defined sustainability reporting requirements, control, and sanctions, accountable and transparent sustainability reporting can be achieved. Therefore, studies have shown that sustainability reporting requirements can increase the quantity as well as the quality of sustainability data. In addition, it has also been found that verification of sustainability reporting can increase the reliability and quality of data (Hummel & Jobst, 2024).

2.2.1 Non-Financial Reporting Directive

The Non-Financial Reporting Directive (NFRD) was published in November 2014 (European Commission, 2019ab). The Directive, adopted by the European Commission at the time, required all large companies to report non-financial information, i.e. sustainability information, from 2017 onwards. The reporting obligation imposed by the Commission applies to certain large companies and groups with more than 500 employees.

According to Peill (2022), the NFRD aims to increase transparency and resource efficiency and encourage more sustainable business practices. Peill adds that the Directive will also contribute to the UN Sustainable Development Goals and the Paris

Agreement. In Finland, the requirements of the NFRD have been implemented in the Accounting and Securities Market Act (Peill, 2022).

According to the NFRD, the required sustainability information can be presented in a company's annual report or stand-alone report (European Commission, 2019ab). According to Peill (2022), companies can use reporting standards or frameworks, but the Directive specifies the minimum content of the report. Peill adds that the Directive's mandatory minimum reporting information includes environmental, social, human resources, human rights, and anti-corruption and anti-bribery issues. The NFRD Directive obliges companies to include at least the following information in their report (Peill, 2022):

- Description of the company's business model
- Operating principles, including due diligence processes
- Results of compliance with these operating principles
- The most significant sustainability-related risks regarding the company's operations
- The company's business relationships, products, or services that are likely to cause adverse effects
- How does the company manage these sustainability risks
- Non-financial indicators relevant to the company's business

From 2024 onwards, more and more companies will be subject to mandatory sustainability reporting as the EU's Corporate Sustainability Reporting Directive (CSRD) comes into effect in a phased implementation (Peill, 2022).

2.2.2 EU Corporate Sustainability Reporting Directive

In April 2021, the EU Commission approved the new Corporate Sustainability Reporting Directive (CSRD) as committed to the European Green Deal (KPMG, 2022b). CSRD will affect the existing Non-Financial Reporting Directive (NFRD), which as the name implies

non-financial information reported. The Corporate Sustainability Reporting Directive increases the reporting requirements for organizations more than before and the Directive brings more organizations under the scope of sustainability reporting. According to (KPMG, 2022b) the NFRD reporting framework has covered around 11,700 organizations within the EU but the forthcoming CSRD Directive will bring around 49,000 companies and groups under the sustainability reporting requirements.

The CSRD will add more detailed reporting requirements to the previous NFRD under the developing European Sustainability Reporting Standards (ESRS) (European Commission, 2023). According to the European Commission, the ESRS standards will first be used by companies covered by the NFRD for reporting data for the 2024 financial year from the beginning of 2025. According to Hummel and Jobst (2024), the CSRD will also introduce a requirement for external verification of sustainability data and digital tagging of reported data. In addition, reporting requirements will be extended to the corporate value chain and the definition of double materiality for sustainability reporting will become part of the annual report of companies and organizations (Hummel & Jobst, 2024).

2.2.3 EU Taxonomy

The EU adopted in June 2020 a taxonomy regulation (Hummel & Jobst, 2024). This regulation provides for a classification system for environmentally sustainable economic activities. According to (Hummel & Jobst, 2024) the EU taxonomy regulation applies to sustainable finance operators under the SFDR as well as to companies under the NFRD and CSRD. The Taxonomy Regulation defines a classification system to determine which of a company's economic activities are environmentally sustainable. Companies then report on their activities based on this classification. Hummel and Jobst (2024) list the six environmental objectives of the EU Taxonomy regulation, which are:

1. climate change mitigation

2. climate change adaptation
3. the sustainable use and protection of water and marine resources
4. the transition to a circular economy
5. pollution prevention and control
6. the protection and restoration of biodiversity and ecosystems

According to Hummel and Jobst (2024) to be considered environmentally sustainable, a company must meet three conditions defined in the EU taxonomy. These are:

1. The activity must substantially contribute to meeting at least one of the six environmental objectives
2. The activity does not significantly harm meeting any of the six environmental objectives
3. The activity is carried out in compliance with minimum safeguards

The taxonomy regulation entered operation in the financial year 2021, which will be reported at the beginning of 2022. According to the European Commission (2021), the taxonomy regulation will evolve and will be reviewed regularly.

2.2.4 Materiality

The term "materiality" has traditionally been used in finance to refer to factors that affect financial performance (Delgado-Ceballos et al., 2023). International Accounting Standards Board (ISAB) (2010) defines materiality as: “information is material if omitting it or misstating it could influence decisions that users make based on financial information about a specific reporting entity”. Companies have been required to provide this information because it has been important for investors (Delgado-Ceballos et al., 2023). More recently, ESG factors were also found to affect financial profitability and since then, more attention has been focused on the relevance of ESG factors, leading to the development of ESG data reporting and metrics (van Zanten & Huij, 2022). According

to the European Commission (2019b), economic considerations should not focus too narrowly on materiality but instead should include social and environmental impacts to achieve and ensure global sustainability in the future.

When companies and organizations provide ESG reporting to investors using their defined materiality metrics, they tend to focus on the risks and opportunities that have an economic impact (Delgado-Ceballos et al., 2023). This is part of addressing financial materiality for investors. However, Delgado-Ceballos and others (2023) note in their study that many other stakeholders such as governments, customers, and other communities are also concerned about the impact of a company's actions, both socially and environmentally. They show that reporting on the external impacts of companies has primarily been intended for stakeholders, but today, increasingly, investors are also beginning to use and require this information in their investment decisions. As a result, economic materiality and stakeholder materiality considerations have together acquired the term double materiality (Delgado-Ceballos et al., 2023). The double materiality of a company or organization and the report on it provides a comprehensive picture of the relationship between business and sustainability and the external factors that affect business (Delgado-Ceballos et al., 2023).

Studies have shown that these two different types of materiality were originally developed for different audiences, but have shown that from a societal perspective, the pursuit of sustainability has had a positive impact on investors over the longer term (Ortiz-de-Mandojana & Bansal, 2016). Double materiality, therefore, involves looking at economic materiality and stakeholder materiality at the same time. This serves as a framework for identifying the sustainability interests of investors as well as the external impacts and opportunities of the company on society and the environment (Delgado-Ceballos et al., 2023). Following the CSRD Directive, the identification of double materiality will be part of the sustainability reporting and the annual report (Hummel & Jobst, 2024). According to KPMG's (2022a) research, materiality assessment and reporting are useful for companies of all sizes and serve as a cornerstone of reporting.

Materiality assesses the impact of ESG themes in a specific context. There is an increasing trend in the assignment of material topics, according to a study (KPMG, 2022a). Globally, 71% of N100 companies have announced materiality assessments in their report (KPMG, 2022a).

2.2.5 GRI - Global Reporting Initiative

GRI, also known as the Global Reporting Initiative, is an international organization that aims to create a generally accepted framework for companies to report on their corporate social responsibility (GRI Standards, n.d.) The GRI Standards are a set of interlinked standards that enable organizations to report on the impact of their activities to stakeholders and other parties (GRI Standards, n.d.). According to the KPMG (2022a) sustainability reporting survey study, GRI is the most used reporting standard worldwide. Since 1997, GRI has remained the established non-financial reporting standard. According to a KPMG survey, 68% of N100 companies globally and 87% in Finland use the GRI framework.

According to the GRI Standards (n.d.), the standards contain guidance and information on how to report on sustainability. They also include recommendations as well as requirements for organizations to report on the impact of their activities, both positive and negative, on sustainability. The GRI standards can be used by any organization in any sector. The information reported can be used by the organization to inform its strategies and guide its decision-making, and by stakeholders to assess the information reported, for example by investors to assess how the organization is integrating sustainability into its operations (GRI Standards, n.d.). The GRI Standards are divided into three sets of standards: the GRI Universal Standards, the GRI Sector Standards, and the GRI Topic Standards. Figure 5 shows the division of GRI standards into Universal, Sector, and Topic standards.

The GRI Universal Standards include three categories which are:

- GRI 1 Foundation 2021: Describes the overall purpose of the GRI standards and explains how the standards are used. Includes requirements for an organization to report in compliance with the GRI standards. GRI 1 also defines principles such as the accuracy, balance, and feasibility of what should be reported (GRI Standards, n.d.).

- GRI 2: General Disclosures 2021: This includes general information related to the organization's structure and reporting practices such as the organization's activities, strategy, employees, policies, and stakeholder engagement. This information provides an overview of the organization that helps to understand its impact (GRI Standards, n.d.).

- GRI 3: Material topics 2021: Includes standards that allow an organization to identify the issues that are material to them in terms of their impacts and how to report and manage those issues (GRI Standards, n.d.).

The GRI Sector Standards are designed to improve the coverage and consistency of reporting by organizations and to improve the quality of reporting (GRI Standards, n.d.). Sector Standards will be developed for about 40 different sectors, starting with those that have the greatest impact on sustainability. The Sector Standards identify the topics that are material to each sector and require organizations to report in compliance with these standards (GRI Standards, n.d.). Sector Standards consist of an overview of the characteristics of the sector, such as activities and business relationships, and a main section listing the material topics of the sector. Material issues relate to the most significant impacts associated with each sector that an organization is required to report on. This may also include reportable topics other than material if the Topic Standard is not sufficient to meet all the desired reportable information (GRI Standards, n.d.).

The Topic Standard contains information that allows an organization to provide information on various topics such as waste, health, and safety. Each of these standards

includes an overview and information on how the organization manages the impacts associated with the topic to be reported. The Topic Standard is selected based on what the organization has identified as material (GRI Standards, n.d.).

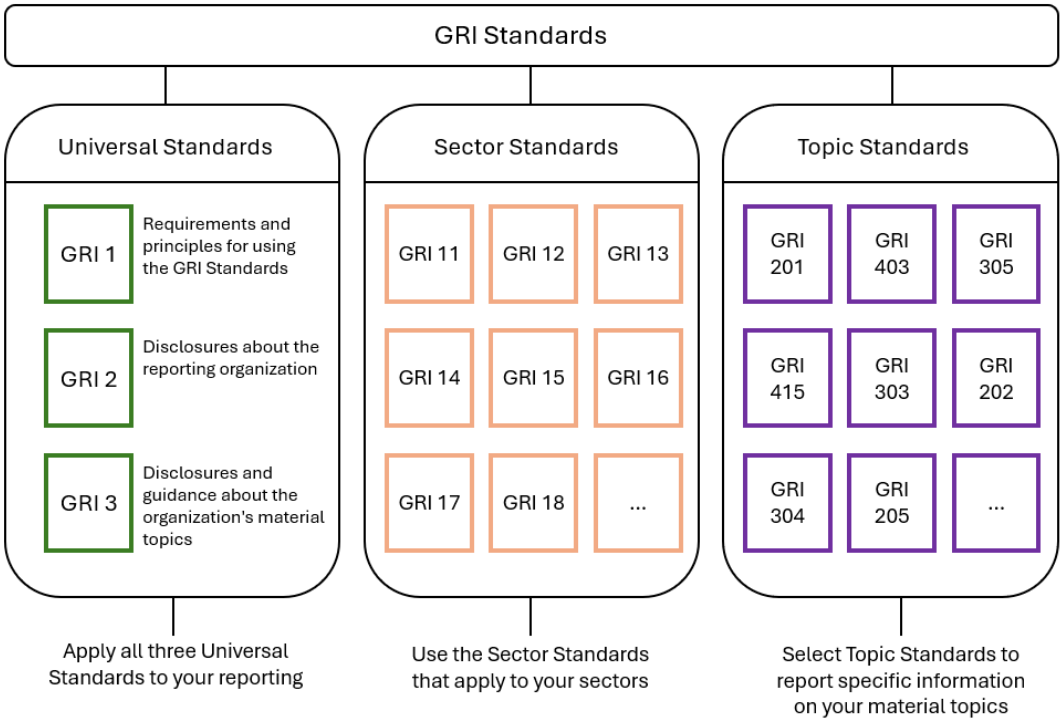


Figure 5 GRI Standards: Universal, Sector and Topic Standards (GRI Standards, n.d.).

2.2.6 SASB - Sustainability Accounting Standards Board

According to SASB Standards (n.d.), SASB standards can be used to report industry-specific risks and opportunities related to sustainability. SASB standards have been developed for 77 different sectors, including the most central themes and questions related to sustainability for each sector. SASB standards are an essential requirement for organizations to achieve consistent and comparable sustainability reports (SASB Standards, n.d.).

In August 2022, the SASB standards were transferred to the responsibility of the International Sustainability Standards Board (ISSB), which operates under the IFRS foundation. In the future, ISSB will take care of the maintenance and development of SASB standards. According to a study by KPMG (2022a), 33% of N100 companies globally report according to SASB standards.

2.2.7 TCFD - Task force for Climate-related Financial Disclosure

The Task Force for Climate-related Financial Disclosure (2017) (TCFD) is a reporting framework developed for the risks and opportunities caused by climate change. The TCFD reporting framework is used internationally and its organizations can report their climate risks using common standards. The Task Force for Climate-related Financial Disclosure (2017) has identified four areas for TCFD: Governance, Strategy, Risk Management, and Metrics and Targets. Below these, there are still different subsections of reporting recommendations that organizations should be able to respond to (Task Force for Climate-related Financial Disclosure, 2017).

Governance refers to the management of climate-related risks and opportunities in the organization. The Strategy defines the effects of climate-related risks and opportunities on the organization's business and its strategy. Risk Management includes the processes that enable the organization to determine climate-related risks and to assess and manage them. The Metrics and Targets section contains metrics and targets that are used to measure and evaluate risks and opportunities. According to the Task Force for Climate-related Financial Disclosure (2017), the purpose of these four themes and the reporting recommendations placed under them is to help investors and others understand how companies report their sustainability-related risks and opportunities. According to a KPMG (2022a) study, 34% of N100 companies globally report according to TCFD.

2.3 ESG assessments

ESG assessments evaluate the sustainable development of companies and organizations and the actions taken for it, as well as their social impact (Iris Carbon, 2023). ESG assessments give investors a picture of the company's sustainable development situation and how well the company is doing compared to other companies. According to Iris Carbon (2023), there are several different ESG classifications, and they compare sustainability performance from different perspectives. Investors and companies should understand the assessments well because ESG assessments provide important information that traditional financial measurements do not provide. It is possible that companies with strong financial performance still have weak work against climate change. In addition to investors, companies also benefit from the assessments, as they enable companies to identify areas where sustainability performance could be further improved. With more and more investors looking at ESG factors, successful companies in these areas attract investors and investments (Iris Carbon, 2023). According to Zumente and Lāce (2021), more than 500 different ESG assessments are available, but most investors still trust the most influential actors. This study examines the following ESG classifications of case companies: EcoVadis, CDP, and MSCI.

2.3.1 EcoVadis

The Ecovadis methodology measures the quality of a sustainability management system with its policies, actions, and results. The EcoVadis assessment measures 21 sustainability criteria, which are grouped under the following four themes: Environment, Labor & Human Rights, Ethics, and Sustainable Procurement. These 21 criteria are based on sustainability standards such as the UN Global Compact initiative and the Global Reporting Initiative (GRI) standards. (Iris Carbon, 2023.)

According to EcoVadis (2024), the score is on a scale of 0-100 and reflects the level of a company's sustainability management system. EcoVadis says companies that

demonstrate a strong management system according to the EcoVadis sustainability criteria can be recognized with EcoVadis medals. There are four medals: Platinum, Gold, Silver and Bronze. Platinum medals are awarded to the top 1%, Gold to the top 5%, Silver to the top 15%, and Bronze to the top 35% (EcoVadis, 2024). Companies are compared to all companies in the EcoVadis database, and not just those in the same sector, for example. Scorecards and medals are reviewed annually.

2.3.2 CDP - Carbon Disclosure Project

CDP, formerly known as the Carbon Disclosure Project, is a sustainable development scoring system that aims to motivate companies to act against environmental impacts (Iris Carbon, 2023). According to Iris Carbon (2023), the scoring evaluates companies' responses and awareness of environmental issues as well as environmental management methods and management progress. Iris Carbon adds that the points are based on the information and answers provided by the companies. After this, the points are converted into percentages in relation to other companies. The CDP scoring system is based on the principles of CDP's sustainable economy and its goal is to improve the level of environmental protection of companies (Iris Carbon, 2023).

The CDP (n.d.) scoring method has three issues that are measured, and these are climate change, forests, and water. After this, the companies are classified from point D to point A. According to CDP (n.d.) scoring system is in line with sustainability standards such as TCFD and is thus able to offer comparable information in all markets. The level of sustainability can be compared with the CDP score, whose scale is between D- and A. CDP (n.d.) defines the levels of scoring classification as follows. D- and D points (Disclosure) describe the starting point for organizations that want to show that they are starting to do things in terms of future sustainability. Scores C- and C (Awareness) indicate the company's level of awareness of environmental issues and how they relate to their business and how they affect people and the ecosystem. Scores B- and B (Management) companies take environmental impacts into account in their operations

and have ensured environmental management in their operations. B- and B level companies have taken steps to manage their environmental impacts to some extent, but not steps that would make the company a leader in its field. Companies with points A- and A (Leadership) have shared climate leadership and publicized actors in terms of climate change, forest preservation, and water use. These companies present their activities in frameworks such as TCFD. A and A- level companies have also set targets and strategies against climate change (CDP, n.d.).

2.3.3 MSCI - Morgan Stanley Capital International

MSCI (n.d.) (Morgan Stanley Capital International) ESG assessments can be used to measure and classify how well a company manages financially impactful ESG risks and opportunities. According to MSCI, the MSCI ESG classification uses a rules-based methodology, with which the classifications are given to companies based on how well they manage ESG risks in relation to other companies. The MSCI ESG rating scale is between CCC-AAA. Classes CCC and B are counted as laggard levels, BB, BBB and A are average and AA and AAA classes are leader levels (MSCI, n.d.).

According to Iris Carbon (2023), MSCI ESG Research is one of the largest independent ESG assessments. They add that MSCI provides ESG assessments for over 6,000 companies worldwide and over 400,000 stocks and bonds. MSCI ESG Research examines 37 ESG questions related to environmental, social, and governance areas. Companies are audited for MSCI classification once a year, and companies participate in an official data verification process (Iris Carbon, 2023.).

3 Research methodology

This chapter introduces the research methodology used in the study. The chapter begins by presenting the methods and methodologies chosen for the study. This is followed by a description of the data used in the study and the data collection. The data analysis section presents an analytical framework that covers the themes that will be discussed from the data in the research. Finally, the fourteen case companies used in the study and their key figures are briefly presented, and the companies are compared with each other based on key figures.

3.1 Qualitative research

According to Tuomi and Sarajärvi (2009), qualitative research can be seen as an umbrella under which many very different types of qualitative research can be found. Qualitative research can be seen in a very wide sense as well as in many different narrow senses (Tuomi & Sarajärvi, 2009). According to research, at least 34 different characteristics of qualitative research can be found, but they can be narrowed to a few data collection methods, which are: participant observation, in-depth interviews, analysis of written material, and phenomenology (Tuomi & Sarajärvi, 2009; Niirainen, 1990).

In general, qualitative research is always empirical research, which means that it is based on different types of data and their analysis (Juhila, 2024). However, Juhila emphasizes that empiricism does not exclude theoreticality; on the contrary, he says that it is not possible to conduct empirical qualitative research without some type of theoretical basis. According to Juhila, in the past, deductivism, i.e. research that primarily takes a theoretical basis, which is then tested by empirical research. Inductive research, on the other hand, starts from the data and is therefore perceived as more theory-free. Thus, deductive is often associated with quantitative research, and inductive with qualitative research. However, Juhila stresses that this is misleading, as it is possible to conduct

qualitative research with a deductive approach and inductivity does not always exclude the theoretical element.

One common basic analytical method that can be traditionally used in all forms of qualitative research is content analysis (Tuomi & Sarajärvi, 2009). In general, content analysis can be seen as a method of qualitative research, but also as a loose theoretical framework. In this study, fourteen sustainability reports of different Finnish listed companies for the year 2022 are used and the study uses content analysis of qualitative research to analyze these sustainability reports. Content analysis can analyze documents systematically and objectively and generally, the material used in the study is either classified, thematized, or typed. In this study, data is grouped by typology. Typing is the process of looking for common perspectives within certain themes in the data to form a generalized view of these (Tuomi & Sarajärvi, 2009).

This study uses content analysis as a method, and more specifically deductive content analysis. In this case, the classification of the study is based on a previous theory, framework, or conceptual system (Tuomi & Sarajärvi, 2009). The first step in theory-based content analysis is the formation of an analytical framework in which the issues to be investigated in the study are selected from the data (Tuomi & Sarajärvi, 2009). This study is structured, which means that only the data that fit the analytical framework and are predefined are collected from the data, and other data are excluded. In this type of structured theory-based content analysis, previous theories can be tested in a new context.

In addition to qualitative research, this research is also a case study and, in detail, a multi-case study. According to Robson (2002), a case study is “a strategy for doing research that involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence.” According to Yin (2018), a multi-case study analyses two or more cases simultaneously. These multiple cases generally have some common characteristics, but also some differences (Yin, 2018).

However, Ridder (2017) adds that multi-case studies can also contribute to theories by comparing differences and similarities between cases. This study analyses fourteen different cases, which are the sustainability reports or the sustainability data of fourteen different Finnish companies as part of their annual report.

Studies produced using content analysis may also often be criticized for being incomplete (Tuomi & Sarajärvi, 2009). This means that a content analysis has been carried out on the data, but this analysis has not been analyzed and no conclusions or results have been drawn from it. In this case, the organized data is presented as a result. Finally, the results are discussed in relation to previous research, a summary of the current state is presented and conclusions are drawn in this research.

3.2 Data description and collection

In this research, the data is based on secondary data as it is based on the sustainability reports of fourteen existing listed companies operating in Finland in the Basic Materials or Industrials according to the Nasdaq classification. Some of the reports are independent sustainability reports and some of the sustainability data are part of the company's annual report. The objective of this study is not to conduct a direct industry analysis but to analyze the current state of sustainability reporting by listed Finnish manufacturing companies in general. These fourteen companies were selected as large, listed companies, which means that sustainability reporting is mandatory for them, and the industries were limited to Basic Materials or Industrials according to the Nasdaq classification, leaving 14 companies to examine the current state of sustainability reporting.

The companies were selected as follows:

1. A Finnish-listed company
2. The company is classified in a large-cap
3. The operating sector in Nasdaq is the Basic Materials or the Industrials

4. Sustainability report available for 2022

The data in this study is based on secondary data as it uses existing data. Some companies report their sustainability report as a stand-alone report and some companies include their sustainability reporting data as part of their annual report. Sustainability reports are public and available on the company's website.

3.3 Data analysis

In this research paper, theoretical content analysis is used. For this purpose, the classification of the study is based on the previously discussed theory on sustainability and its background, the United Nations Sustainable Development Goals, sustainability directives, frameworks and standards, and sustainability assessments. For data analysis, an analytical framework will be developed to identify the issues to be analyzed in sustainability reports, which this research aims to explore. This is a structured study, so other data from sustainability reports will be excluded from this research.

In this research, the following issues are examined in case studies of corporate responsibility reports:

1. What frameworks, agreements, and initiatives are mentioned (GRI, SASB, TFCD, Global Compact, SBT, etc.)
2. the United Nations Sustainable Development Goals (SDGs)
3. Which topics have been chosen by the company as material?
4. Coverage of ISO 14001
5. ESG assessments (EcoVadis, CDP, MSCI, etc.)
6. Greenhouse gas emissions (Scope 1,2,3)
7. Business risks related to sustainability and climate change
8. Sustainability-related targets

The first research question examines how companies report on their sustainability performance and what frameworks and regulations they have implemented in their reporting. This research question on sustainability reporting looks at the previously mentioned point 1. The second research question answers the current state of sustainability reporting by case companies and looks at points 2-8.

3.4 Case companies

This research consists of 14 different case companies and their sustainability reporting. These companies are Finnish companies operating in the industrial sector. The companies were selected so that they are Finnish, public limited companies belonging to large cap and are listed on the Nasdaq in the Basic Materials or Industrials sectors. The industrial sector plays a major role in the overall Finnish economic picture and national economy, and it is therefore important that industrial companies develop and are able to compete in a changing global market. As already stated earlier, sustainable development activities have a positive impact on a company's reputation and success.

The size of the enterprises is chosen to be large, thus limiting the number of enterprises to fourteen. This provides a comprehensive overview of the current state of sustainability reporting by Finnish industrial companies. The following table provides a brief overview of the companies, including important figures such as revenue, EBIT and number of employees, the number of operating countries, and the products and services it produces. The data is reported for 2022 so the data is for the same year as the sustainability reports. Note to companies, Metso Outotec changed their name to Metso in 2023. The sustainability reporting data used in this research is from 2022 when the name was still Metso Outotec so the name Metso Outotec is used in this research. Table 2 shows the case companies.

Table 2 Case companies

Company	Sector in Nasdaq	Revenue 2022 (MEUR)	EBIT 2022 (MEUR)	Number of employees 2022	Operating countries 2022	Products and services	References
Kemira Oyj	Basic materials	3 569,6	347,6	4 902	36	Industrial chemicals for the paper and pulp industry, water cleaning and the oil and mining industry.	(Kemira, 2023); (Kemira, n.d.)
Metsä Board Oyj	Basic materials	2 479,6	521	2 248	17	Metsä Board is part of Metsä Group. The main products are various types of board.	(Metsä Board, 2023); (Metsä Board, n.d.)
Outokumpu Oyj	Basic materials	9 494	1 086	8 591	30	Stainless steel.	(Outokumpu, n.d.)
Stora Enso Oyj	Basic materials	11 680	1 891	21 790	20	Paper, packaging, timber and biomaterial solutions.	(Stora Enso, 2023); (Stora Enso n.d.)
UPM-Kymmene Oyj	Basic materials	10 500	1 013	16 600	43	Pulp, various papers, labels, wood-based renewable diesel and naphtha, electricity, plywood and wood products.	(UPM-Kymmene, 2023)
Cargotec Oyj	Industrials	4 089	332	11 526	19	Cargo and load handling solutions and services.	(Cargotec, 2023); (Cargotec, n.d.)
Huhtamäki Oyj	Industrials	4 479	395	18 927	37	Consumer packaging, mainly food packaging and disposable food and beverage packaging and hygiene packaging.	(Huhtamäki, 2023); (Huhtamäki, n.d.)
Kone Oyj	Industrials	10 906,7	1 031,2	63 277	60	Elevators, escalators and automatic doors, as well as solutions for the maintenance and renovation of equipment throughout the life cycle of buildings.	(Kone, 2023)
Konecranes Oyj	Industrials	3 364,8	223,2	16 500	50	Lifting solutions and container handling equipment and services for all brands of cranes.	(Konecranes, 2023)
Metso Outotec Oyj	Industrials	5 295	504	16 705	50	Stone crushing and screening equipment, process solutions for mineral processing, process solutions for metal processing and refining, services and consumables for various business sectors.	(Metso, 2023); (Metso, n.d.)
Valmet Oyj	Industrials	5 074	436	17 548	40	Supplier of technology, automation solutions, services and spearheads for the pulp, paper and energy industries.	(Valmet, 2023); (Valmet, n.d.)
Wärtsilä Oyj Abp	Industrials	5 842	325	17 500	79	For marine engines, digital technologies, propulsion systems, hybrid technologies and integrated powertrain systems, and for the energy market, fuel-fired balancing power plants, hybrid solutions, energy storage and optimisation technologies.	(Wärtsilä, 2023); (Wärtsilä, n.d.)
Uponor Oyj	Industrials	1 386,2	135,5	4 000	26	Drinking water, waste water, heating and cooling solutions.	(Uponor, n.d.)
Vaisala Oyj	Industrials	514,2	62,5	2 200	17	Measuring instruments and systems for environmental measurement and industrial markets.	(Vaisala, 2023)

Although all companies belong to the large-cap size category, there is variability between case companies in terms of indicators. Table 2 shows the case companies, while tables 3 and 4 show the revenue of each company and the number of employees and operating countries. In terms of revenue, Outokumpu, Stora-Enso, UPM-Kymmene, and Kone stand out as the largest companies and Vaisala stands out as the smallest. In terms of

employees, Kone stands out as the largest and Kemira, Metsä Board, Uponor, and Vaisala as the smallest. Operating countries are almost correlated with the number of employees, except that Wärtsilä emerges as the largest with operations in several countries.

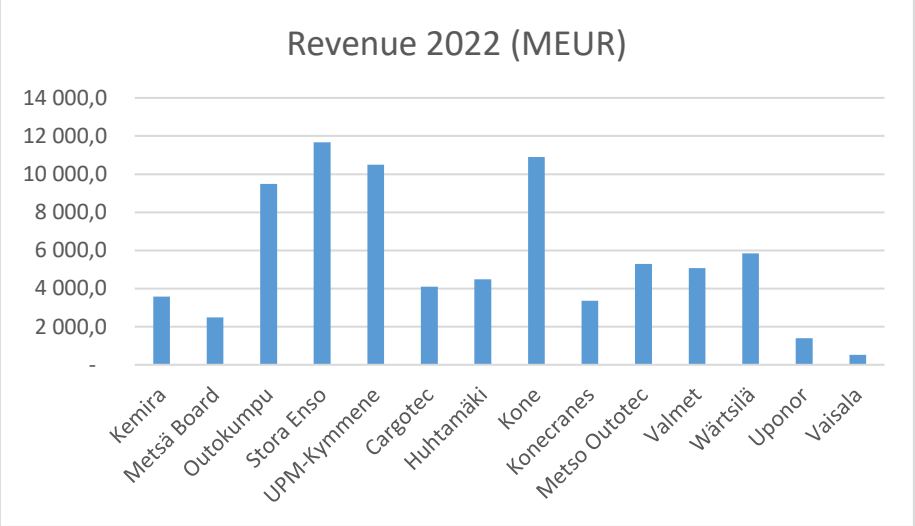


Figure 6 Revenues in case companies

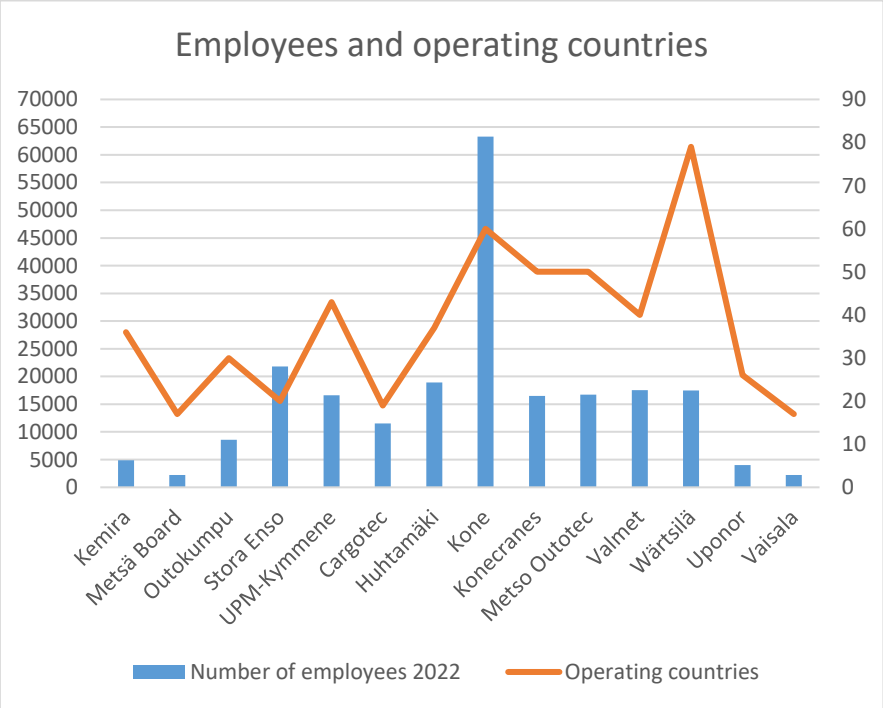


Figure 7 Number of employees and operating countries in case companies

4 Research findings and discussion

This chapter presents and discusses the findings of this study. The chapter “Sustainability reporting implementation and frameworks” answer research question one. It presents how case companies report on their sustainability, which international agreements they mention as complying with, and which sustainability reporting frameworks are used by case companies. This chapter discusses section 1 of the analytical framework defined in the methodology section. The “Current state analysis” chapter presents the current state of sustainability reporting by case companies under the themes of sections 2-8 of the analytical framework. Each of these seven topics is discussed individually, comparing the similarities and differences in the sustainability reporting of the case companies and whether the sustainability data are comparable.

4.1 Sustainability reporting implementation and frameworks

This section focuses on the implementation of sustainability reporting by case companies, whether the company mentions international agreements, initiatives, and targets in its report, and which sustainability reporting frameworks companies have used. Table 5 presents the findings for the case companies. The first row shows whether the company reports its sustainability information as a stand-alone sustainability report or as part of the company's general annual report. The table then shows whether international agreements such as the Paris Climate Agreement, Global Compact, Green Deal, EU SDGs, Science-based targets, and the EU Taxonomy Regulation are mentioned in the sustainability reporting of the case company. The last rows of the table show which sustainability reporting frameworks are used by the case companies. The GRI, SASB, and TCFD frameworks are considered for this analysis.

In general, the sustainability report or annual review of each case company that was included, sustainability information is easily accessible and found on the company's website. Of the case companies, 5 reported their sustainability information in a stand-

alone sustainability report, and the rest 9 in their annual review. Metso Outotec also has a GRI appendix attached to their annual report where they discuss several sustainability indicators and GRI standards. Valmet, on the other hand, mentions TCFD reporting it's in the TCFD Annex and UPM-Kymmene mentions SASB reporting on their website. These specific comments are indicated in yellow in Table 5. Outokumpu's Green Deal is also mentioned in yellow as they mention in the Green Deal agreement that "allowance prices are expected to increase as the EU Green Deal requires further greenhouse gas reductions in the future", but they do not explicitly mention that their strategy, targets, or report follow the Green Deal agreement.

Table 5 shows that companies mention in their reports that they are complying with the UN Global Compact initiative and have incorporated the UN Sustainable Development Goals into their operations. Only four companies mention the Green Deal initiative, the EU taxonomy is mentioned by 12/14 companies and Wärtsilä is the only company that does not mention Science-based targets. All companies also mention that they report according to GRI standards. However, there are differences with the other reporting frameworks SASB and TCFD. Companies that do not mention using the SASB and TCFD frameworks also do not mention the Paris Climate Agreement in their reports.

Table 3 Sustainability Reporting frameworks in case companies

	Kemira	Metsä Board	Outokumpu	Stora Enso	UPM-Kymmene	Cargotec	Huhtamäki	Kone	Konecranes	Metso Outotec	Valmet	Wärtsilä	Uponor	Vaisala
Reporting format, Sustainability (S) or Annual report (A)	S	A	S	A	A	A	A	S	S	A	A	A	S	A
Paris Climate Agreement	x	x	x	x	x	x	x	x	x		x			
Global Compact	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Green Deal	x		(x)	x			x						x	
EU SDG	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Science Based Targets	x	x	x	x	x	x	x	x	x	x	x		x	x
Eu Taxonomy	x	x	x	x	x	x	x			GRI-annex	x	x	x	x
GRI	x	x	x	x	x	x	x	x	x	GRI-annex	x	x	x	x
SASB		x		x	Website	x	x	x	x	GRI-annex				
TCFD	x	x	x	x	x	x	x	x	x	x	TCFD-annex			

4.2 Current state analysis

This chapter presents the current state of sustainability reporting by case companies. It answers the second research question, using the analytical framework defined earlier in the methodology section. This section examines seven previously identified topics of sustainability information and compares their differences, similarities, and comparability.

4.2.1 UN Sustainable Development Goals in case companies

This chapter presents the UN Sustainable Development Goals (SDGs) in case companies. Table 6 shows which of the SDGs the case companies have implemented into their operations and sustainability reporting. The table also includes the total numbers for each company, how many of the UN SDGs they have integrated into their operations, and the total number for each UN SDG.

Two yellow boxes can be seen in the table 6. Huhtamäki identifies three main objectives and two sub-objectives in their report. These two sub-objectives are marked in yellow boxes in the table. The table shows that two SDGs are not defined for any of the case companies: no poverty and zero hunger. The three most common SDGs are climate action (14/14), responsible consumption and production (13/14), and decent work and economic growth (13/14). The table also shows how the case companies have integrated different amounts of SDGs into their activities. Of the case companies, Wärtsilä has integrated the highest number of UN SDGs into its operations, with 12/17. This is followed by Kone, Konecranes, and Vaisala with the highest number of targets, all 9/17. Stora Enso 3/17 and Kemira 4/17 have the least number of UN SDGs in their operations. The table shows that although Wärtsilä has the most targets in their operations, they have not adopted target 12 "responsible consumption and production", but the other case companies have this target.

Table 4 UN Sustainable Development Goals in case companies

	Kemira	Metsä Board	Outokumpu	Stora Enso	UPM-Kymmene	Cargotec	Huhtamäki	Kone	Konecranes	Metso Outotec	Valmet	Wärtsilä	Uponor	Vaisala	Total
1. No Poverty															0
2. Zero Hunger															0
3. Good Health and Well-Being								x	x			x		x	4
4. Quality Education								x				x			2
5. Gender Equality		x						x	x			x	x		5
6. Clean Water and Sanitation	x	x			x		(x)			x	x		x		6 (7)
7. Affordable and Clean Energy		x	x		x				x		x	x		x	7
8. Decent Work and Economic Growth	x	x	x		x	x	x	x	x	x	x	x	x	x	13
9. Industry, Innovation, and Infrastructure		x	x			x		x	x	x		x	x	x	9
10. Reduced Inequality									x			x		x	3
11. Sustainable Cities and Communities								x				x	x	x	4
12. Responsible Consumption and Production	x	x	x	x	x	x	x	x	x	x	x		x	x	13
13. Climate Action	x	x	x	x	x	x	x	x	x	x	x	x	x	x	14
14. Life Below Water												x			1
15. Life On Land		x		x	x		(x)								3 (4)
16. Peace and Justice, Strong Institutions						x		x	x			x		x	5
17. Partnerships to Achieve the Goal			x			x						x			3
Total	4	8	6	3	6	6	3 (5)	9	9	5	5	12	7	9	

4.2.2 ISO 14001 coverage in case companies

This chapter discusses the scope of ISO 14001 certification in case companies. 13/14 of the companies report that their sites are ISO 14001 certified. Table 7 shows the coverage of ISO 14001 certification of the companies. Differences in reporting the extent of certification can be found between the case companies. Of the case companies, 9/14 report the percentage of certified sites. UPM-Kymmene and Metso Outotec mention verbally that almost all/most of the sites have ISO 14001 certification. Vaisala reports their percentage as 91%, but this is not comparable with the others as their report indicates that 91% of employees work at an ISO 14001 certified site. However, this does not indicate the certification rate of the number of Vaisala sites. Uponor's report does not mention ISO 14001 certification of its sites at all.

Table 5 ISO 14001 coverage in case companies

Company	**ISO 14001 coverage**
Kemira	89 %
Metsä Board	100 %
Outokumpu	100 %
Stora Enso	100 %
UPM-Kymmene	Almost all production sites
Cargotec	86 %
Huhtamäki	66 %
Kone	100 %
Konecranes	83 %
Metso Outotec	In the most important sites
Valmet	78 %
Wärtsilä	Mentioned
Uponor	-
Vaisala	91% (not comparable)

4.2.3 Materiality in case companies

This chapter focuses on the material topics for the current state analysis. Table 8 shows the top material topics identified by the case companies themselves. From the case companies' self-identified material topics, it can be seen that some of the companies have divided the material topics into ESG-categorized topics. Others have not made such a clear categorization into themes, although ESG topics are found among the material topics. Among the top material topics of the case companies, several topics are common to many of the case companies. Such material topics include social issues such as human rights and occupational safety, climate, and environmental issues such as climate, emissions, water use, and the circular economy, and responsible sourcing and responsible supply chains. In general, companies identify several topics that are material to them, Wärtsilä listed only five, which are very generic. Stora Enso includes a Materiality heading in their report and it says:

> ”Stora Enso acknowledges the concept of double materiality in its sustainability strategy and reporting. Climate change, biodiversity, and circularity are considered to present the most significant financial risks and opportunities for Stora Enso, and these topics are highlighted in the Strategy section. Stora Enso’s other material impacts on the environment, people, and communities are reported in the Strategy and Sustainability reporting sections.”

However, they do not directly identify their top material topics. Therefore, Stora Enso's report is not comparable with others on this topic. Metsä Board mentions in their report that they have made a new materiality determination in 2022 according to which they will report for the first time with 2023 data.

Table 6 Top material topics in case companies

Kemira	Safety • Critical incident risk management • Hazardous materials • Health & safety

	People • Health & safety • Diversity in leadership • Employee D&I Water • Supporting customers in sustainability • Water & wastewater • R&D • Innovation and partnerships Circularity • Supporting customers in sustainability • Circular economy • Use of renewable & biobased raw materials • Carbon handprint • R&D • Innovation & partnerships Climate • Supporting customers in sustainability • Carbon footprint & environmental impact • Climate and renewable energy • Carbon handprint • R&D • Innovation & partnerships
Metsä Board	• Ensuring biodiversity and the ecological sustainability of forest use • Mitigating climate change and reducing emissions • Resource efficiency and responsible production • Respect and dignity for everyone • Promoting safety and well-being at work • Innovation and open-minded cooperation • The contribution of the forest-based bioeconomy to society
Outokumpu	Priority areas • Emissions and carbon footprint reduction • Circular economy and waste • Responsible supply chain management • New technologies Enablers of sustainability • Adapting to climate change • Ethical business and governance • Health, safety, and well-being at work • Human rights • Product safety • Data protection and privacy • Diversity and inclusion • Attracting and developing talent Local responsibility • Biodiversity and ecosystems • Water management • Local communities and corporate citizenship

Stora Enso	Mentioned materiality
UPM-Kymmene	Financial management • Business ethics and values • Competitiveness • Regulatory environment • Responsible procurement Environment • Biodiversity • Biocircular economy • Climate change • Product responsibility • Responsible forest management Social • Decent work and fair compensation • Diversity and involvement • Employee commitment • Welfare and safety • Local commitment
Cargotec	• Climate change • Circular economy • Human rights • Health and safety • Diversity, equality and inclusion • Sustainable economy and finance • Responsible sourcing and selling
Huhtamäki	Environment • Biodiversity and ecosystems • Circularity • Energy • GHG emissions • Materials • Waste, including waste generation and recycling • Water Social • Employee development • Food safety • Food availability and affordability • Health and Safety Human rights • Local communities • Ethics and governance • Economic prosperity • Unethical business, including corruption
Kone	Developing responsible products and services • Creating value for our customers • Environmental impact over the life cycle of products

	• End-user safety and accessibility Towards a more sustainable future • Responsible innovation • Responsible business models • Carbon neutral operations Inclusive and skilled people • Fair employment practices • Safety and well-being of employees and contractors • Diversity, equality and inclusion • Skills development Good corporate citizen • Long-term returns • Prosperity through taxes and jobs • Ethical business practices
Konecranes	• Responsible business conduct including data privacy and anti-competitive behavior • Anti-corruption • Safety of employees • Product related safety and security • Respect of human rights • Diversity, equity and inclusion • Greenhouse gas emissions • Circular economy including materials and waste • Fair sourcing
Metso	Planet Positive solutions and innovations • Energy efficiency and emissions • Water efficiency • Circular economy solutions • Safety of customer operations A responsible and reliable partner • Environmental efficiency of operations • Responsible procurement • People and our culture • Health and safety at work
Valmet	Environmental responsibility • Circular economy • Climate change • Environmental efficiency Social responsibility • A committed work community • Health and safety at work • Corporate Citizenship Good governance • Business ethics • Sustainable supply chain • Transparent reporting
Wärtsilä	• Emissions • Compliance with environmental regulations

	• Financial results • Education and training • Health and safety at work
Uponor	• Developing solutions for energy and water efficiency • Promoting end-user comfort, health and safety • Preventing corruption • Promoting the circular economy and minimizing waste • Improving the quality, sustainability, and reliability of solutions • Preventing child labour • Improving the health, safety, and well-being of workers • Improving energy and water efficiency in production • Minimising greenhouse gas and other emissions • Good management • Improving the competitiveness of solutions • Stakeholder cooperation • Safe use of chemicals • Promoting diversity and equality of workers • Promoting a non-discriminatory workplace • Business transparency • Providing transparent product information • Preventing forced labour • Managing the supply chain in a prohibitionist way • Supporting biodiversity
Vaisala	Value for employees • Meaningful work • Well-being • Learning and development Value for society and the environment • Economic value • Active participation in society and the scientific community • More enlightened societies • Resource efficiency • Security and safety Environment • Energy • Emissions • Waste Staff • Turnover • Collective agreements • Diversity, equality and inclusion Health and safety at work • Impact of the COVID-19 pandemic • Collaboration • Proactive reporting and investigation of incidents • Accidents • Occupational health care Ethics and compliance

	• Fight against corruption and bribery • Respect for human rights and human rights due diligence • Conflict minerals • Fair competition • Product safety Responsible supply chains • Supplier management

4.2.4 Greenhouse gas emissions in case companies

Case companies report their greenhouse gas emissions in scope 1, 2, and 3 categories. Of the case companies, 12/14 provided GHG data in their sustainability data. Metso Outotec mentioned in its annual report that the annual report contains a GRI annex where this information can be found. For Metso Outotec, the information was extracted from the GRI-annex. Outokumpu, on the other hand, mentioned in its sustainability report that "All carbon-related indicators are available in the sustainability indicators tool", followed by a link to the sustainability indicators tool. Therefore, for Outokumpu, the data was retrieved from the sustainability tool. The other 12 case companies have reported their GHG emissions in their reports.

Table 9 presents each company's information on whether GHG data are reported in the report, scope 1, 2, and 3 emissions, how emissions are reported, and in which unit emissions are reported. Scope 2 can be reported either on a market-based or on a location-based. Companies that have reported both scope 2 emissions are reported in Table 9, but Cargotec, Huhtamäki, and Valmet have reported only one, and UPM-Kymmene and Uponor have not indicated which of their scope 2 belongs. How emissions are reported in the section, the table shows whether a case company has reported its emissions either as CO_2 emissions or as CO_2e or CO_2-eq emissions. At the end, the table shows in which unit the case company reports its emissions. In the table, the numbers are presented in such a way that the lower the emission, the greener the grid, and the higher the emission, the more yellow or even red the grid. In the table, the numbers are expressed in tons.

Table 7 GHG emissions in case companies

	Kemira	Metsä Board	Outokumpu	Stora Enso	UPM-Kymmene	Cargotec	Huhtamäki	Kone	Konecranes	Metso Outotec	Valmet	Wärtsilä	Uponor	Vaisala
In report	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Scope 1	139 000	236 037	1 043 226	1 770 000	7 200 000	24 900	233 000	116 800	40 100	43 868	21 100	46 629	7400	481
Scope 2 Location-based	655 000	291 482	459 780	690 000	2 200 000			33 400	20 200	89 951	65 100	24 309	1 300	2442
Scope 2 Market-based	677 000	147 061	1 043 226	190 000		11 300	449 000	10 000	2 900	5 076		30 705		34
Scope 3	3 609 000	1 816 979	2 717 748	6 010 000	5 000 000	6 435 000	3 445 000	13 086 100	4 650 700	3 650 000	76 345 000	1 941 000	377 600	75 599
CO_2 or CO_2e	CO_2e	Scope 1 & 2 CO_2, Scope 3 CO_2e	Carbon dioxide emissions	CO_2-eq	CO_2	CO_2e	CO_2e	CO_2e	CO_2e	CO_2	CO_2	CO_2e	CO_2e	CO_2e
(t=tonnes, kt= kilo tonnes, mt=million tonnes)	kt	t	t	mt	mt	t	t	t	t	t	t	t	1000 t	t

In terms of how emissions are reported, the table shows that some companies such as UPM-Kymmene, Metso Outotec, Valmet, and Metsä Board have reported their Scope 1 and 2 data as CO_2 emissions. Outokumpu reports its emissions as "Carbon dioxide emissions" and therefore this can be classified as CO_2. The remaining companies report in terms of carbon dioxide equivalents (CO_2e or CO_2-eq). By reporting in terms of carbon dioxide equivalents, emissions also include other greenhouse gas emissions than just carbon dioxide. These include emissions of water vapor, methane, tropospheric ozone, nitrous oxide, and fluorinated greenhouse gases. By using the CO_2e or CO_2-eq format, case companies take into account all greenhouse gas emissions and thus give a more accurate picture of their overall climate impact. Among the case companies, Metso Outotec, UPM-Kymmene, Valmet, Metsä Board (scope 1 and 2), and probably Outokumpu only report their CO_2 emissions. This reporting format does not give an overall picture of GHG emissions, even though CO_2 emissions are one of their largest GHG emissions. If these companies reported all of their GHG emissions, their emissions would probably be higher.

There are also other differences in the reporting of greenhouse gas emissions besides CO_2e and CO_2-eq. Carbon dioxide emissions are reported in tons in the reports, but the unit varies between case companies. Stora Enso and UPM-Kymmene use million tons, Kemira kilo tons, Uponor 1000 tons, and the remaining companies report in tons. The larger the unit used, the smaller the figure appears in the report. However, there is no evidence that those with the highest emissions use larger units.

Figure 6 shows the number of emissions reported by Scope 1, 2, and 3 case companies in all fourteen case companies. From the figure, it can be seen that Valmet's Scope 3 emissions are so large that the emissions of the other companies do not even reach the figure because Valmet's Scope 3 emissions are proportionally so large that the axes of the figure are too large for the other emissions. However, it can be seen from the graph that, in general, Scope 3 emissions are the highest in all companies except UPM-

Kymmene, where the highest category is Scope 1. Figure 7 shows a more detailed comparison of how emissions are distributed in each case company.

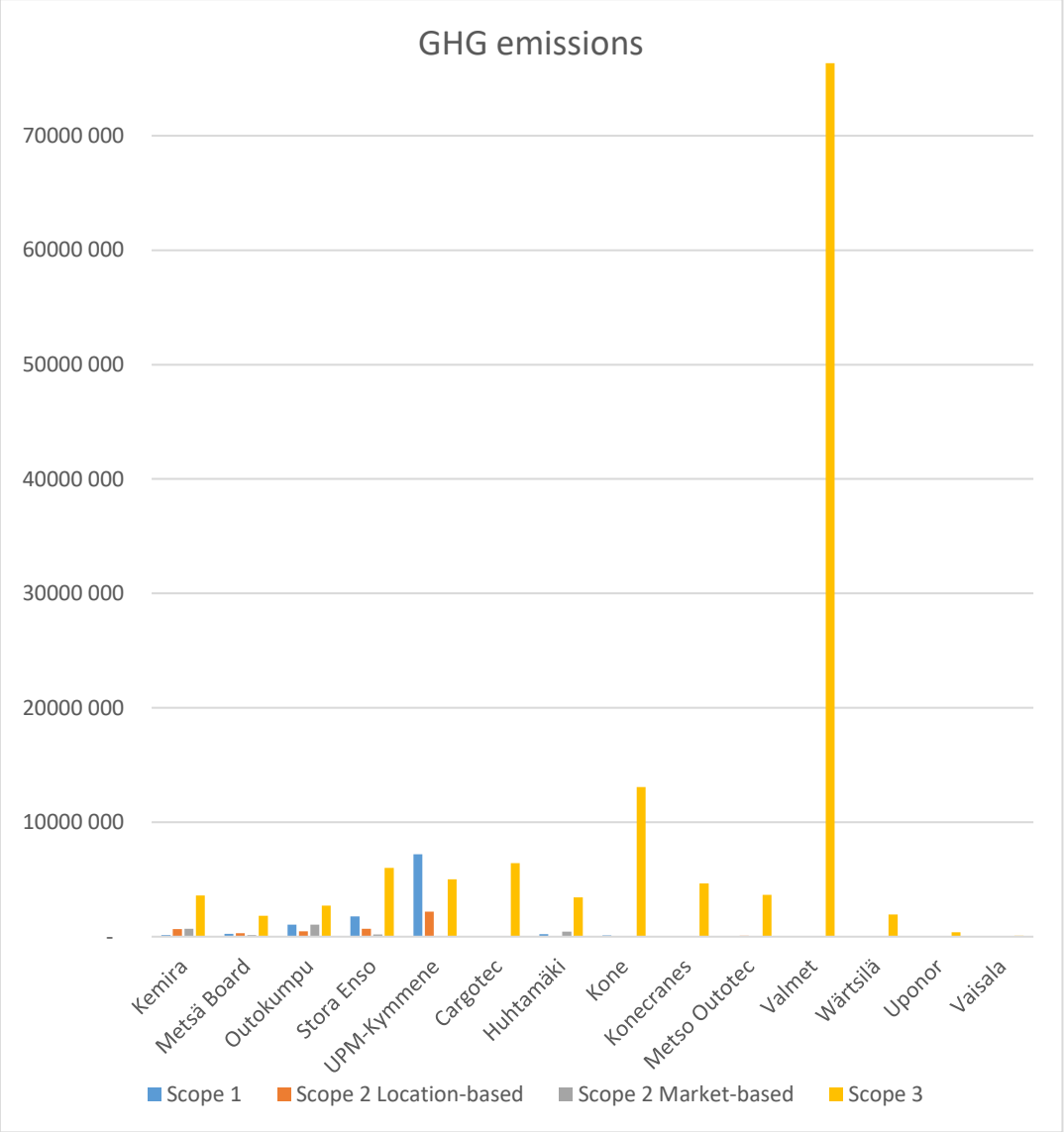


Figure 8 GHG emissions in case companies

Figure 7 shows how the emissions of each case company are distributed in percentage terms across the different scopes. In this figure, the case companies cannot be compared with each other, but the different emission categories of each case company can be compared. The figure takes into account the emissions calculated using Scope 2 location-based and market-based calculation methods. So, in reality, both of these are not counted in the total emissions of the company. However, in this figure, they indicate their

size relative to the others. Figure 7 further highlights how much Scope 3 emissions are generally the largest part of the case company emissions. In particular, Cargotec, Kone, Konecranes, Metso Outotec, Valmet, Wärtsilä, Uponor, and Vaisala have more than 95% of their emissions from Scope 3 emissions.

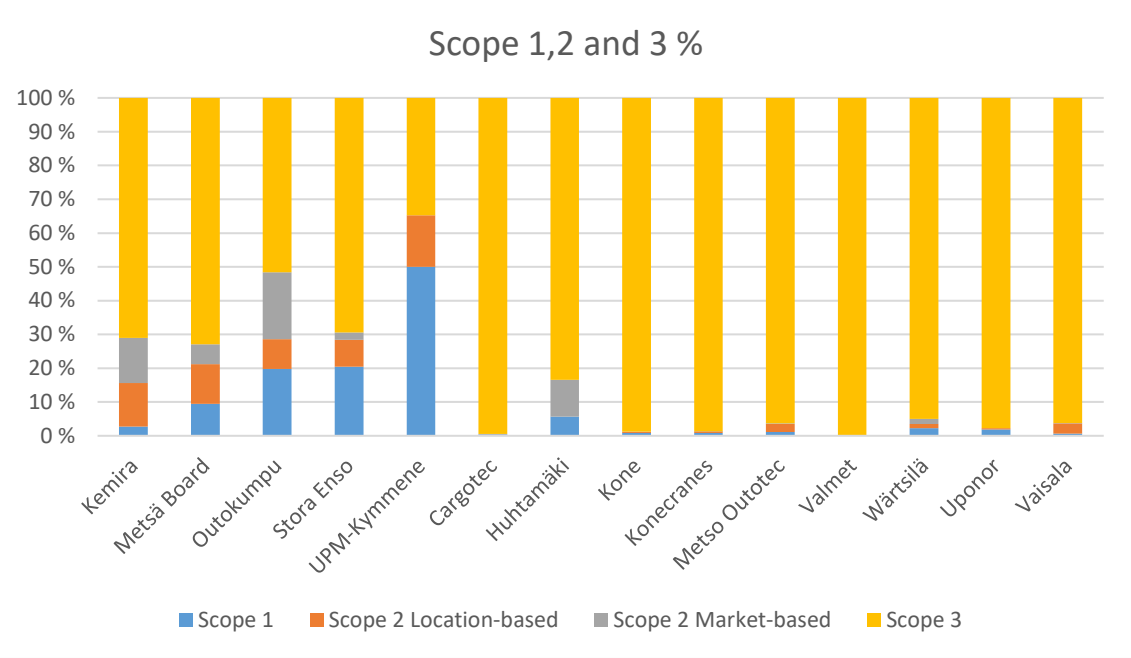


Figure 9 Scope 1, 2 & 3 % in case companies

Other observations on the reporting of GHG emissions by case companies is that case companies often report their combined emissions or Scope 1 and 2 combined emissions with a lower Scope 2 value. Among the case companies this has been done by Konecranes and Kone. Kone has also reported their market-based Scope 2 figure more clearly in their table and location-based is not similarly reported in their table. Outokumpu reports in their sustainability tool first market-based Scope 2 and separately by selecting from the table location-based Scope 2 is also displayed. Outokumpu is the only company that does not report GHG emissions in its sustainability report and has not included its data in a separate annex like Metso Outotec. However, Outokumpu discusses GHG emissions in their sustainability report as a separate chapter. However, the reporting mainly focuses on the reduction of emissions by different percentages in

different years for each different Scope emission category. Outokumpu reports total carbon dioxide emissions per tonne produced stainless steel in its report. This number does not give an overall picture in their sustainability reporting because to find out the total emissions one would need to know how many tons of steel Outokumpu has produced.

Pictures 1, 2, and 3 show screenshot examples of how case companies report their greenhouse gas emissions in their reports. The examples highlight the differences and variability in the presentation of GHG emissions reporting. Picture 1 shows a screenshot of Metsä Board's GHG emissions. They present the data in a table where data from 4 previous years can also be seen so that the data can be easily compared. From Metsä Board's table, you can see how they report both market-based and location-based Scope 2 emissions. Additional explanations for the data can be found below the table. The table also shows how Metsä board reports Scope 1 and 2 emissions in terms of CO2 only and Scope 3 emissions in terms of CO2 equivalent. This is also indicated in the explanation section.

GREENHOUSE GAS EMISSIONS (CO_2) 2018–2022

	2022	2021	2020	2019	2018
Direct fossil-based CO_2 emissions (Scope 1), t [1]	236,037	255,467	240,036	250,259	288,579
Indirect fossil-based CO_2 emissions (Scope 2, market-based), t [2]	147,061	184,028	282,236	262,442	275,048
Indirect fossil-based CO_2 emissions (Scope 2, location-based), t [2]	291,482	313,030	383,937	384,781	431,037
Indirect fossil-based CO_2e emissions (Scope 3), t [3]	1,816,979	1,854,840	1,847,773	1,026,896	1,058,455
Biogenic CO_2 emissions, t	1,950,901	1,712,639	1,812,952	1,815,179	1,837,299
Fossil-based CO_2 emissions (Scope 1 + Scope 2, market-based), kg CO_2/tonne produced [4]	116.1	134.0	161.7	159.8	173.5

[1] Scope 1 emissions consist of carbon dioxide emissions. The 2019 figure has been retroactively corrected due to more detailed emission measurements.
[2] Scope 2 emissions consist of carbon dioxide emissions. The calculation of market- and location-based Scope 2 emissions has been revised retroactively due to changes in fuel-specific emission factors for purchased heat, which is why the figures for the years 2018–2021 have been corrected. The amount of location-based Scope 2 emissions is affected by the average energy distribution of Metsä Board's production countries.
[3] Scope 3 emissions consist of carbon dioxide and other greenhouse gas emissions converted into carbon dioxide equivalents. The increase in Scope 3 emissions after 2019 is explained by changes in calculation methodology in 2020: two new categories (Processing of sold products and End of life treatment of sold products) were added in the calculations. Calculation methodology related to purchased chemicals was also updated.
[4] Due to the revised calculation of market-based Scope 2 emissions and revisions of paperboard tonnes used in the environmental calculation, the figures for the years 2018–2021 have been corrected retroactively.

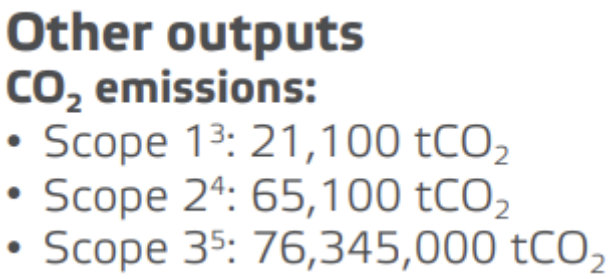
Picture 1 Screenshot from Metsä Board GHG emissions

Picture 2 shows a screenshot of the emissions reported in the Valmet report. Valmet only reports location-based Scope 2 data. For the numbers behind the scopes, Valmet opens like this:

3. Scope 1 emissions are direct greenhouse gas emissions from sources owned or managed by Valmet, such as the use of fossil fuels in production facilities.

4. Scope 2 emissions (location-based) are indirect emissions from purchased electricity, heat, cooling energy, and steam generation used by Valmet at its sites.

5. Scope 3 emissions include five selected relevant categories: 1) purchased goods and services; 4) transport and distribution (upstream); 6) business travel; 9) transport and distribution (downstream), and 11) use of products sold.



Picture 2 Screenshot from Valmet GHG emissions

Picture 3 shows a screenshot of the emissions reported by Stora Enso. Stora Enso also reports the data in a table and sorts the scope 3 emission sources into its rows. In the table, Stora Enso reports scope 2 emissions on market-based emissions. However, in the explanatory text below the table, Stora Enso states that the location-based scope 2 emissions would be 0,69 million tonnes. This figure is higher than the market-based scope 2 and total emissions are calculated with market-based scope 2.

	Fossil CO_2 equivalent (million tonnes)		
Other performance indicators	**2022**	**2021**	**2020**
Scope 1: Direct emissions from operations[1]	1.77	2.09	2.02
Scope 2: Emissions from purchased energy consumed in operations[1 2]	0.19	0.22	0.31
Scope 3: Emissions from other sources along the value chain			
Harvesting and wood transportation	0.38		
Fuels and energy (production and transportation)	0.44		
Purchased materials (production and transportation)	1.93		
Transportation and distribution of products to customers globally	0.85		
Processing of products by customers	2.41		
Scope 3 total	6.01	7.83	7.38
Total emissions	**7.97**	**10.14**	**9.71**

[1] Historical figures recalculated due to divestments or additional data after the previous annual report.
[2] The CO_2 factors used for purchased energy (scope 2) largely follow the market-based methodology, which means that almost all Stora Enso units apply CO_2 factors provided by their energy suppliers. When applying currently available location-based factors, scope 2 emissions for 2022 are 0.69 million tonnes of CO_2 equivalents (0.73 million tonnes in 2021).

The examples in the figures show the differences between the units used by companies. Metsä Board and Valmet report their emissions in tonnes and Stora Enso in millions of tonnes. The figures look very different when using the larger unit format. When comparing them, the units must first be changed to the same format to make a successful comparison.

4.2.5 ESG assessments in case companies

This chapter focuses on the assessments of case companies in different international sustainability reporting classifications. This study focuses on the EcoVadis, CDP, and MSCI assessments, but Table 10 also lists others that are mentioned in the case company reports. Table 10 shows the sustainability assessments assigned to the case companies. The EcoVadis rating from worst to best is between Broze-Platinum, CDP from D- to A, and MSCI from CCC-AAA.

Table 10 shows that Outokumpu, Metso Outotec, Wärtsilä, and Vaisala do not have any of the three sustainability assessments. The data is extracted from sustainability reports, so if a company would have reported these only on its website or in another communication, it would be excluded from this study. However, Wärtsilä mentions in its data that, "Wärtsilä has been selected for several sustainable development indexes".

And then mentions several indexes and that further information is available on our website. Companies with EcoVadis, CDP, and MSCI assessments have done well in the ESG assessments. These case companies are either in the best category of the rating or in the second-best category. Huhtamäki indicates its CDP rating as "management level". Management level in the CDP rating includes B and B- grades. This rating is the second best.

Table 8 ESG assessments in case companies

	Kemira	Metsä Board	Outokumpu	Stora Enso	UPM-Kymmene	Cargotec	Huhtamäki	Kone	Konecranes	Metso Outotec	Valmet	Wärtsilä	Uponor	Vaisala
EcoVadis	Mentioned	Platinium		Platinium	Platinium		Gold	Gold	Gold		Gold		Silver	
CDP	Mentioned	A			A	A-	Management level (B or B-)	A	A-		A-		B	
MSCI		AAA			AAA		A				AAA			
Other mentioned	Mentioned ISS ESG and Sustainalytics	Sustainalytics, ISS ESG Corporate Rating, ISS QualityScore			Dow Jones Sustainability Indices		Global Corporate Sustainability Assessments				Sustainalytics, ISS QualityScore	Wärtsilä has been selected for several sustainable development indexes.	Sustainalytics, ISS ESG	Sustainalytics

The ESG assessments show that if a company has received the best Platinum level rating from EcoVadis, for example, it has also achieved the best rating in the CDP and MSCI assessments. These companies include Metsä Board and UPM-Kymmene. UPM-Kymmene and Metsä Board both say they have achieved CDP A levels in all three categories: climate, forests, and water. Both companies mention in their report that only 12 companies out of nearly 15 000 achieved A levels in all three categories. The other companies that have received a CDP rating report that they have achieved the level they received or cite climate work as the reason for their achievement. Uponor, which has achieved a B rating, mentions that "according to the CDP rating, there is still most improvement to be made in risk communication and indirect emissions related to the value chain (Scope 3)".

4.2.6 Sustainability risks in case companies

This chapter presents the climate change-related risks of case companies, which they report in their sustainability information. Out of the 14 case companies reporting sustainability information, 11 companies report risks related to climate change. Among the case companies, Uponor, Valmet, and Konecranes do not provide business risks related to climate change in their sustainability information. However, Valmet stated that the risks can be found in the TCFD appendix and on their website. Konecranes reports that their climate risk can also be found on their website. Uponor mentions in the GRI content index part of the standard section 201-2 Economic impacts caused by climate change and other risks and opportunities in the section that it does not disclose "economic impacts of risks or opportunities due to the sensitivity of the commercial nature of the data".

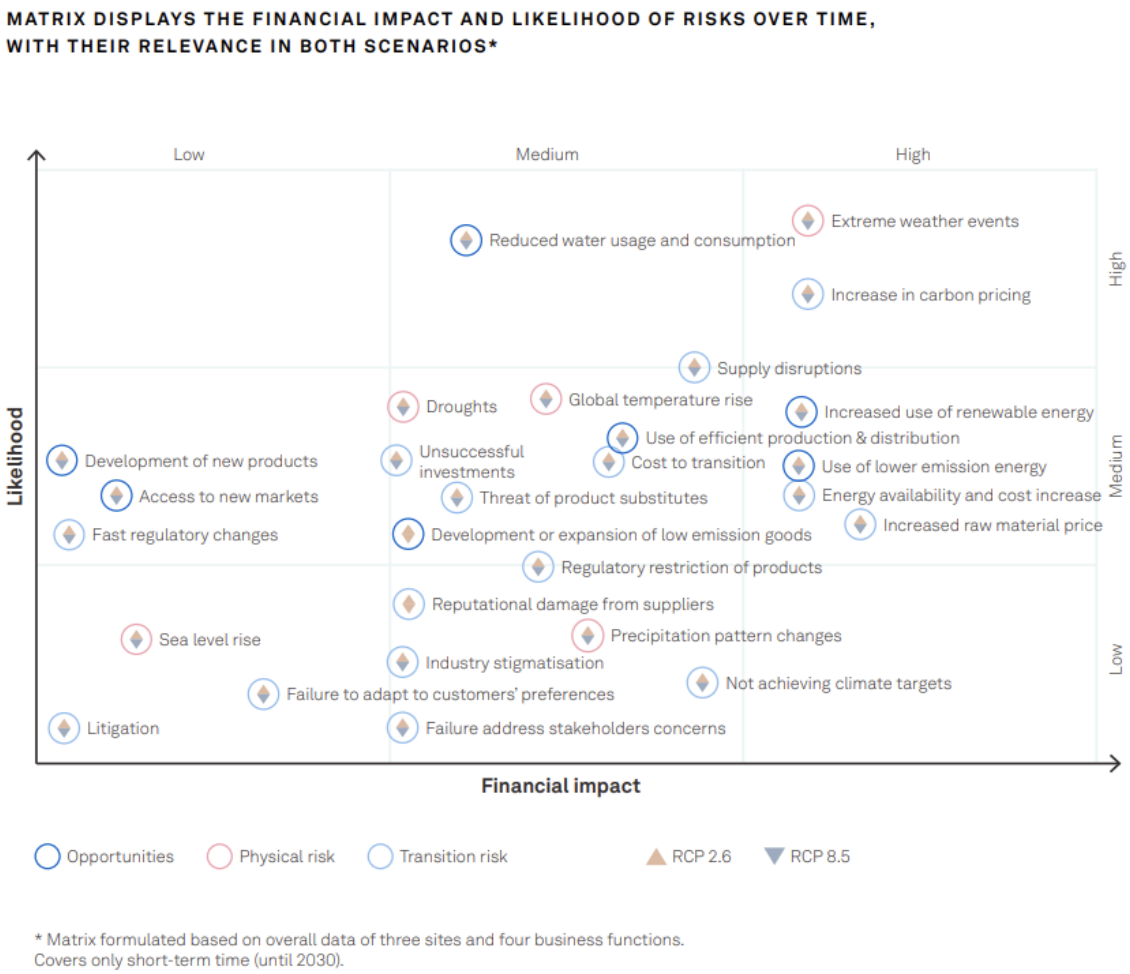
Vaisala, Outokumpu, Cargotec, Huhtamäki, Stora Enso, and UPM-Kymmene report their climate risks verbally in their responsibility report. Kemira, Metsä Board, Kone, and Metso Outotec include a risk matrix in their report on climate risks or report their risks in table form. Kone mentions that the sustainability report contains a summary of risks

and a more detailed analysis is in Kone's annual report. Climate-related risks generally arise in case companies in four main themes, which are regulation and politics, market and reputation, extreme weather phenomena and global warming, and technology. Table 11 presents these four main themes in case companies climate-related risks. Below the four main themes are listed themes that came up in the reports and what the consequences of these would be for companies. Several consequences for companies would increase the prices of raw materials, transport costs, production costs due to the rise in energy prices, and problems with logistics and availability. Climate warming and extreme weather events rose especially in the risks of the forest industry companies Metsä Board, UPM-Kymmene, and Stora Enso's reports.

Table 9 Climate risks in case companies

Regulation and policy	Extreme weather and global warming
Changes in the pricing of greenhouse gas emissions ➢ Increase in costs Emphasis on forest carbon sinks and forest protection, and regulations that limit logging ➢ Rising costs and availability of raw materials Regulation of chemicals used in production	Storms, drought, floods, forest fires, natural disasters ➢ Raw material availability and price increases ➢ Business uncertainty ➢ Damage to premises Global warming ➢ Water use and availability ➢ Products to withstand changing conditions ➢ Raw materials complicate wood availability ➢ Disruptions in energy supply lead to price increases ➢ Insect and tree disease damage in the forest industry
Market and reputation	Technology
• Bad stigmatization of the sector • Consumer criticism of forest use • Diversion of wood use to other uses such as bio-products • Supply disruptions due to component availability from suppliers • Changes in customer preferences • Product range to match the sustainable development market	• Technological developments and changes and staying ahead of competitors • Low-emission technology

Pictures 3, 4, and 5 show how companies that have reported climate-related risks in matrix or table format have reported the risks. Figure 3 shows Kemira's climate-related risks divided into Physical risks and Transition risks, and they also report opportunities. In matrix format, reporting can show the potential financial impact of the risks and how likely the company believes the risks are to fail. Based on these axes, the risks are ranked in the matrix. Figures 4 and 5 show Metsä Board's climate-related risks in table format. They indicate both negative and positive impacts of the risk in the table. The table section also has a section where they describe risk management.



Picture 3 Screenshot from Kemira climate risks

The transition risks and opportunities arise from the transition to a low-carbon economy, i.e. compliance with the goals of the Paris Agreement of limiting global warming to less than 2, or preferably to 1.5, degrees.

	Risks and opportunities	Impact	Management
Regulation	The regulation aiming to combat climate change and reduce greenhouse gas emissions poses significant requirements for a new kind of production technology and results in changes to the pricing of energy and greenhouse gas emissions. This can increase costs in both production and transport.	↓	Metsä Board has set targets for improving energy efficiency and shift to the use of entirely fossil free energy in its production. We also encourage our suppliers to set targets for emission reductions.
	Regulation that emphasises the use of forests as carbon sinks and the protection of forests to secure biodiversity limits harvesting volumes.	↓	Metsä Group's wood supply has set targets, the achievement of which increases the sequestration of carbon in forests and helps secure the biodiversity of forests. We use our raw material resource-efficiently to avoid waste in production. Our aim is to make full use of the production side streams.
	Regulation that acknowledges that forest industry products can replace materials made from fossil-based raw materials, the production of which, furthermore, generates substantial amounts of fossil-based emissions.	↑	The main raw material of Metsä Board's products is renewable wood fibre and our target is for all our raw materials and packaging materials to be fossil free. The use of fossil free energy in production and the light weight of the products reduce their carbon footprint.
Markets and reputation	Consumers' critical attitude towards the use of forests – forests are seen as carbon sinks or as needing protection.	↓	All the wood fibre we use is traceable and sourced from sustainably managed forests which are certified or, at the least, meet the criteria for controlled wood. Metsä Board communicates openly on the impact of its operations and products with the help of life cycle assessments, for instance, and aims for active dialogue with customers, suppliers and other stakeholders.
	Consumers favour easily recyclable packaging made from a renewable, fossil free raw material.	↑	The main raw material of Metsä Board's products is renewable wood fibre and our target is for all our raw materials and packaging materials to be fossil free. The use of fossil free energy in production and the light weight of the products reduce their carbon footprint. All our paperboards are recyclable and/or compostable. Good packaging design allows us to further reduce the environmental impact of paperboard packaging and increase recyclability.
	Wood use is increasingly being directed to products other than paperboard products (other bio-based products).	↓	Metsä Board participates in projects that develop new types of wood fibre-based packaging solutions (such as ExpandFibre).
	Wood is Finland's most significant processed natural resource, providing a good basis for the bioeconomy, circular economy and innovations based on a renewable raw material.	↑	Metsä Board's main raw material is renewable and recyclable wood fibre. Paperboard already has an extensive recycling infrastructure, and Metsä Board actively participates in the activities of organisations promoting recycling (including 4evergreen and the European Paper Packaging Alliance).

Picture 4 Screenshot from Metsä Board climate risks 1

The physical risks and opportunities involve changes in temperatures and precipitation, and they will materialise if climate change is not mitigated.

Acute changes	Risks and opportunities	Impact	Management
Extreme weather phenomena	Storms, drought and floods cause disruptions in production or complicate the transport of raw materials and products.	↓	Metsä Board prepares for the risks arising from extreme weather phenomena through both company and mill-level risk assessments. Examples of such measures include sufficient reserves of wood, the control of water levels with dam arrangements, and ensuring power distribution in exceptional situations. The supply chain is preparing for alternative partners or transport routes.
Chronic changes	**Risks and opportunities**	**Impact**	**Management**
Rising average temperature and changes in precipitation	The increased frequency of droughts weakens the availability of the process and cooling water needed by mills and causes production breaks.	↓	Metsä Board's mills are not located in high water risk areas, which supports the company's competitiveness in the face of climate change. The company's target to reduce the use of process water and enhance the recycling of water within the process also reduces the water risk.
	Increased precipitation and floods impair the quality of surface waters, thereby impairing the availability of process and cooling water and causing production breaks.	↓	Metsä Board has drawn up plans on how to secure paperboard deliveries in the event that production is interrupted at one of its mills.
	Harvesting conditions are complicated due to a lack of snow and frost and because of increased precipitation.	↓	Metsä Group actively monitors which areas allow harvesting and what are the alternative wood supply areas. When necessary, wood reserves can be increased during good harvesting conditions. Metsä Board's long-term contract with Norra Skog increases the delivery reliability of wood, particularly in Sweden.
	Damage caused by snow, storms, drought, forest fires, insects and fungi are increasing in forests, and changes are occurring in the prevalence of tree species. Alien species are likewise causing problems in forests.	↓	Metsä Group's wood supply provides sustainable forest management services which support forests' adaptation to climate change and help to secure the biodiversity of forests.
	Global warming is expected to increase the growth of forests and the wood removal, which will increase the availability of wood and lower the costs of wood supply.	↑	Cooperation and long-term wood supply contracts (with e.g. Norra Skog) will improve the delivery reliability of wood even further.

↓ Potential negative impact on business operations ↑ Potential positive impact on business operations

Picture 5 Screenshot from Metsä Board climate risks 2

4.2.7 Climate related targets in case companies

This chapter presents the climate-related targets of case companies, which the companies have mentioned in their reports. Table 12 contains the climate targets mentioned by the case companies in their sustainability reports. Every company in the case study mentions climate-related goals in their report in some way and their goal is to reduce emissions. The climate targets of case companies are strongly in reducing emissions from their direct as well as indirect emission works.

Among the case companies, a clear trend emerges in setting targets for 2030. However, there is variation between the case companies between Scope 1, 2, and 3 emissions. All companies have set targets to reduce emissions from at least its operations. Of the case companies, all except Wärtsilä have set clear emission reduction targets at least for Scope 1 and 2 emissions. Wärsilä only mentions that it is aiming for "carbon neutrality in our own operations by 2030". There are differences between companies in how they express their targets for emission reductions. Some companies express their emission targets in scope ratings, but Stora Enso, for example, states its targets as "own emissions and emissions from our value chains". Many companies also report targets for Scope 1 and 2 emissions and targets to reduce emissions from logistics, which is part of Scope 3 emissions but not reported in Scope 3.

In many cases, the targets are set for 2030, but there is variability in the reference year from which the percentage reduction is calculated. Most of the case companies have indicated the reference year in their report. The reference years for the companies range from 2015 to 2019, from which they calculate the targets for reducing their emissions. Among the case companies, Kemira, Stora Enso and Uponor have also set long-term targets between 2040 and 2050, where they aim for carbon neutrality in their operations and Stora Enso even for positive impacts through its own forests. Metsä Board, Metso Outotec, and Wärtsilä, on the other hand, are already aiming for carbon neutrality in their own operations by 2030. Table 12 provides more details on the climate targets mentioned by companies in their reports.

Table 10 Climate-related targets in case companies

Kemira	• Reducing 50% Scope 1 & 2 emissions by 2030, with 2018 as the baseline. • Long-term ambition to be carbon neutral by 2045 for combined Scope 1 and Scope 2 market-based GHG emissions. • Currently evaluating a quantitative reduction target for our Scope 3 emissions under SBTi.
Metsä Board	• Use only renewable energy by the end of 2030, with a target of zero fossil carbon emissions (Scope 1 and Scope 2, market-based).
Outokumpu	• Reduce direct, indirect, and supply chain emissions (Scopes 1, 2, and 3) by 42% per tonne of steel produced by 2030 compared to the 2016 baseline. This means a 30% reduction from the 2020 baseline.
Stora Enso	• Reduce by 50% our greenhouse gas emissions by 2030 compared to the base year 2019, (own emissions and emissions from our value chains). • A net positive effect on our own forests by 2050.
UPM-Kymmene	• Reduces 65% CO2 emissions (scope 1 and 2) by 2030 compared to the 2015 baseline. • Reduce fossil carbon emissions from materials and logistics by 30% from 2018 levels by 2030.
Cargotec	• Reduce greenhouse gas emissions in all three emission scopes by at least 50% from the 2019 baseline by 2030. • Achieve carbon neutrality in its own operations by 2030.
Huhtamäki	• Reduce 27.5% absolute Scope 1 and 2 GHG emissions by 2030, from the 2019 base year.

	• Reduce 13.5% absolute Scope 3 GHG emissions from the end-of-life treatment of sold products by 2030, from the 2019 base year.
Kone	• Carbon neutrality in all operations by 2030 and in production units already in 2024. • Reduce emissions from own operations (scope 1 & 2) by 50% from 2018 baseline by 2030. • Reduce by 40% emissions related to materials and life cycle energy consumption of products (scope 3) relative to ordered products.
Konecranes	• Reduce scope 1,2 & 3 emissions by 50% from 2019 to 2030. • Targets have already been achieved for scopes 1 and 2.
Metso Outotec	• Net zero scope 1 & 2 emissions by 2030. • Reduce CO2 emissions from logistics by 20% by 2025 compared to 2019.
Valmet	• Reduce CO_2 emissions from our supply chain by 20% and from our own operations by 80% by 2030.
Wärtsilä	• Achieving carbon neutrality in our own operations. 2030
Uponor	• Reduce greenhouse gas emissions from own operations by 75% by 2027. • Reduce emissions from supply chains by 20%. • Zero net emissions in 2040.
Vaisala	• SBT-based targets to reduce scope 1 and 3 emissions by 2030.

4.3 Discussion

Sustainability reporting has become increasingly mandatory through global agreements, directives, and legislation. This study examines 14 case studies of companies and their sustainability reporting. The companies included in the study are classified as large-cap

companies with more than 500 employees, meaning that these companies have been covered by NFRD reporting since 2017 and have been subject to sustainability reporting obligations. Sustainability data for all case companies can be found either in a stand-alone sustainability report or as part of the annual report. According to Bloomberg's (2024) research, the highest ESG data priority for companies is regulatory requirements, and climate risk and net solutions. Among the case companies, all are complying with the requirement to report on their sustainability data and, for example, in terms of climate targets and net solutions, companies are complying with EU climate policy or have set even more ambitious targets for themselves. According to a KPMG (2022a) study, 94% of the 100 largest companies in Finland report their sustainability data, while globally 79% of the N100 countries publish their sustainability data.

All fourteen case companies have adopted the sustainability frameworks and agreements defined in the theoretical framework of this study. In this study, as well as in a study produced by KPMG in 2022, the most common sustainability reporting frameworks found are GRI, SASB, and TFCD. Of the case companies, all 14 case companies report using the GRI framework, which is significantly more than the 34% of the N100 countries internationally in the KPMG study. In a KPMG study, the use of the TCFD framework doubled from 2020 to 2022 (KPMG, 2022a). In 2022, 34% of N100 companies will report using TCFD, while 11/14 (79%) of the case companies in this research had integrated the TCFD framework into their reporting. In the KPMG study, 33% of N100 companies internationally reported under the SASB framework, and 8/14 (57%) of the case companies in this research reported under the SASB framework. Also for these frameworks, the case companies in this research have reported internationally according to frameworks that are well above the average for N100 companies.

Referring to the theoretical framework, the Paris Climate Agreement and the UN Sustainable Development Goals have been seen as a turning point in sustainability reporting (Hummel & Jobst, 2024). Similarly, in this study, all companies have incorporated the UN SDGs into their operations and 10/14 companies mention the Paris

Climate Agreement in their reports. In the KPMG study, 54% of N100 companies globally have linked their climate targets to the Paris Agreement and 71% of N100 companies included the SDGs in their reporting (KPMG, 2022a). In this study and the KPMG study, the same three SDGs emerged as the most common SDGs, in slightly different order. Zero hunger also emerges as one of the least used goals in this paper and the KPMG research.

On average, the companies in this case study generally report better than the N100 countries in KPMG's international survey. This study delves deeper into the current situation by looking at 8 different points in more detail, which are:

1. the United Nations Sustainable Development Goals (SDGs)
2. Which topics have been chosen by the company as material?
3. Coverage of ISO 14001
4. ESG assessments (EcoVadis, CDP, MSCI, etc.)
5. Greenhouse gas emissions (Scope 1,2,3)
6. Business risks related to sustainability and climate change
7. Sustainability-related targets

Of these analysis areas, the KPMG study highlights that emerging trends in sustainability reporting in 2022 have been companies setting their climate targets, reducing greenhouse gas emissions, and materiality assessment determination. The case companies in this study generally report better than the N100 companies in the KPMG study on almost all items considered. In this study, almost all companies identified material topics, while a KPMG study shows that globally only 71% of the N100 countries have identified their material topics as ESG topics (KPMG, 2022a). However, KPMG's research shows that the identification of material topics in sustainability reporting is on the rise and they identify it as one of the reporting trends in their study.

There are similarities between companies in their sustainability reporting. The materiality topics identified by case companies cover the same themes as in the

reporting study produced by KPMG, as well as similarities in climate-related risks between companies. In addition, all companies have defined climate targets, which include emission targets for the future. A clear trend emerging from the case companies' targets is the setting of targets for 2030 leading to international agreements such as the 2030 Agenda and the European Union's commitment to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. According to KPMG's (2022a) study, 71% of N100 companies internationally have set carbon targets in their reporting. According to the KPMG sustainability reporting survey, of the N100 companies internationally, 54% have linked their targets to the Paris Agreement and only 5% have linked their targets to regional targets such as EU targets. Of the case companies in this research, 12/14 (86%) reported their carbon targets in their sustainability reporting, and two case companies mentioned in their report where their targets could be found. 10/14 of case companies (71%) mentioned the Paris Climate Agreement in their report. Some companies have also set a long-term target to 2050 or even earlier, in line with the European Union's goal of being carbon neutral by 2050. The EU target takes 1990 as a benchmark. For the targets set by companies, the reference years they report vary between 2015 and 2019. This means that the percentage target set by companies cannot be compared directly with each other, and not directly with the EU target. If a company has been able to reduce their emissions year on year, it can be assumed that the further away from the baseline the greater the percentage reduction in the target, compared to the target year. In the case of climate-related risks for businesses, one common risk was global warming and extreme weather events such as floods, storms, and other natural disasters, which are consequences of climate change. Compared to the KPMG survey internationally, 46% of the N100 companies identified climate change and environmental issues as risks.

Janine Guillot of KPMG (2022a) argues that investors demand consistent and comparable sustainability information from companies and that ESG disclosure is essential in today's business environment. However, in this study, looking at the current state of fourteen case study companies, not all sustainability data were comparable, and

discrepancies were found in sustainability reporting. Jaine Guillot also notes that finding consistency and comparability among voluntary sustainability frameworks and standards has been a challenge. In a Bloomberg (2024) study, Nadia Humphreys also says that the quality and comparability of ESG data is a global challenge. This is also reflected in this study. Companies have also identified the biggest ESG data challenge as data coverage and quality issues with ESG-reported data (Bloomberg, (2024). In determining ISO 14001 coverage in case companies, Vaisala gives a percentage figure in terms of the number of employees working at an ISO 14001-certified site. This is not comparable with the results reported by other companies as the other case companies reported the data directly in terms of the number of sites.

In reporting greenhouse gas emissions, Outokumpu and Metso Outotec do not report these directly in their sustainability reports, so their sustainability reports would not be comparable for this information. Outokumpu only mentions in the emissions section of their report how much they have reduced their emissions and how much they aims to reduce further in the future. The theoretical framework of this study, based on previous studies by Hummel & Jobst (2024) and Christensen and others (2021), discusses that several companies with low sustainability performance have provided positive information to the public or negative issues are hidden behind positive reporting. However, their information is retrieved from websites or the GRI Annex, as these companies mentioned in their sustainability report that the information can be found there, and the report contains a direct link to the information.

There is a difference in the reporting of greenhouse gas emissions between case companies, whether they report only carbon dioxide emissions or carbon dioxide equivalent emissions. These differences make the reports non-comparable as the carbon dioxide equivalent also includes other greenhouse gas emissions than CO_2 emissions. Companies reporting only carbon dioxide emissions would probably have higher carbon dioxide equivalent emissions, as non-carbon dioxide emissions would also be included. The comparison between these data is also affected by the unit used for

reporting. There is variation between companies in the unit they use so when comparing these figures, the figures should always be changed to the same unit first so that the figures are comparable. In addition, all case companies did not mention ESG assessments in their reports and Stora Enso lacked clearly defined materiality topics. This information, which not all case companies have in their reports, does not allow for a full comparison of the case companies. Stolowy and Paugam (2023) identified in the same study that there is still inconsistency between standard setters and companies on sustainability and Baboukardos et al. (2023) identified a "multiverse" of sustainability reporting that makes it challenging to keep up with changes and requirements in sustainability reporting. In a Bloomberg (2024) study, Nadia Humphreys says that in the future, ESG data management will also become a priority and challenge for companies. The number of sustainability reporting and sustainability disclosures is expected to increase in the future with the new directives, which are expected to increase the quantity, quality, and comparability of ESG data reported.

5 Conclusion

This chapter concludes this research. It starts with a summary of the research questions, the methodology used in the research, and the answers to the research questions. The summary also includes managerial implications. Limitations of the study and future research are then presented in the end.

Sustainability reporting allows companies to publish information on the impact of their activities on society and the environment in general through ESG themes. This information is important for stakeholders such as investors and customers. Sustainability activities and sustainability reporting have been proven to have a positive impact on corporate reputation and today sustainability activities are one of the prerequisites for success. International agreements and directives require many companies to report on sustainability and this obligation will be extended in the future with the CSRD.

The purpose of this study was to find out how large Finnish industrial companies have implemented sustainability reporting frameworks and standards and to investigate the current state of sustainability reporting. The aim of this study was to answer the following research questions:

1. How large Finnish listed companies in the Basic Materials or Industrials sector implement sustainability reporting and which frameworks do they adopt?
2. What is the current state of sustainability reporting among large Finnish listed companies in the Basic Materials or Industrials sector?

Fourteen case companies were selected for the research, which are large Finnish public limited companies, and operate in the Basic Materials or Industrials sector according to the Nasdaq classification. To answer the first research question, it was determined how companies report on their sustainability, what sustainability reporting frameworks they have used, and what international standards, agreements, or targets they mention in their sustainability reporting. The second research question sought to determine the

current state of sustainability reporting. In this research, to determine the current state, seven topics were selected for examination. These were reviewed for each case study company and compared with each other, looking for similarities and differences and comparing them with each other. It was also examined whether the information provided by the case companies was comparable with each other.

The 14 case companies in the study have all reported on their sustainability in 2022. It was preferable to report sustainability data as part of the annual report, but five of the case companies had reported the data as a separate report. Regarding international agreements and targets, all companies mentioned their commitment to the Global Compact and the UN Sustainable Development Goals. The Green Deal initiative was the least of these as only 4 case companies mentioned their compliance with it in their report. Of the sustainability reporting frameworks, the GRI framework was used by all companies. Several companies had also adopted the TCFD framework and just over half also used the SASB framework. Case companies had implemented the sustainability reporting frameworks to a significantly greater extent than the global N100 companies.

The second research question was answered through 7 topics that were examined in the sustainability reports of case companies.

1. the United Nations Sustainable Development Goals (SDGs)
2. Which topics have been chosen by the company as material?
3. Coverage of ISO 14001
4. ESG assessments (EcoVadis, CDP, MSCI, etc.)
5. Greenhouse gas emissions (Scope 1,2,3)
6. Business risks related to sustainability and climate change
7. Sustainability-related targets

In general, the sustainability reports of the case companies contained the seven items selected for analysis. However, in topics 2 to 6, at least one company did not mention the topic under review in its sustainability report. Themes 1 and 7 were reported by all companies. Similarities were found in the reporting of the case companies, in particular in the top material topics they identified, in the operational risks related to sustainability, and the climate-related objectives of the case companies were consistent with the international agreements and targets defined in the Framework. Differences were also found between companies and in reporting practices and how these topics were presented in sustainability reports. In particular, there were differences in the reporting of greenhouse gas emissions, which gases were reported, and which units were used. Both companies have almost always set targets for 2030 in their climate targets but the reference year for which the percentage emission reduction target is calculated is different. This leads to a lack of comparability between all reports when data are reported differently.

Within the theoretical framework of this study, previous research has demonstrated the importance of comparable sustainability reporting and identified the challenges of sustainability reporting as a result of inconsistencies between multiple frameworks, changing regulations, and standard setters and companies. This study also highlights the diversity and differences in sustainability reporting between companies. The managerial implications of this study are addressed to companies as well as to standard and contract setters. This study shows that the sustainability data used in this study are not yet comparable in all aspects. Comparable reporting requires equal reporting practices and compliance. However, new standards are already being developed to harmonize sustainability reporting to allow for comparison. It is important that new standards are adopted and monitored by companies in the future to achieve comparable reports in the future.

The data used in this study is sustainability data from 14 case companies, either from their sustainability report or from their annual review, depending on which case

companies have published their sustainability information. It can be assumed that their publicly published annual reports are reliable and thus support the reliability of this study. This research was conducted as a qualitative study and the methodology used was qualitative content analysis. The study examined the sustainability reports of 14 case companies which served as the data for this study. The study was conducted as a structured study, which means that only the information that was predefined was extracted from the sustainability reports, and other information was excluded. This study is also a case study and more specifically a multiple case study. The multiple case study allowed the study to compare differences and similarities between case companies.

5.1 Limitations and future research

This study is limited to 14 case studies of companies operating in the Basic Materials and Industrials sectors according to classification by Nasdaq and which are large Finnish public limited companies. Therefore, this study provides information on the current state of sustainability reporting in large companies in the industrial sector. Only large companies are included in the study, so this study does not directly represent these industries in general, as medium and small companies are not included. Large companies with over 500 employees have also started to implement sustainability reporting as part of their reporting in the past as they are covered by the NFRD and have thus adopted global sustainability reporting principles. The data used in the study was sustainability information published by companies either as a stand-alone sustainability report or as part of an annual review. The study is structured, so only the data that was pre-defined was taken from the data and other data was excluded from this study. Many companies mentioned that some sustainability data could be found on their websites or in other annexes, so this information would not be included in this study. In this study, data on GHG emissions was also retrieved from the GRI Annex or the company's website as they explicitly mentioned this in its sustainability report, thus providing comparable data on emissions for all companies. Thus, the limitation is the data used, if a company, for

example, only published ESG assessments on its website, this data would not be available in this study.

This study consists of an analysis of the current situation through seven different topics. A future study could investigate one of these seven issues in more detail and explore it in further depth, using data other than just sustainability data. For example, a future study could look in more depth at greenhouse gas emissions and how well companies are meeting the targets they have set, with this study defining the targets and the current emissions situation. This research can be used in future studies as a basis for how corporate sustainability reporting will evolve in the future as new international agreements, directives, and standards for reporting become available, especially CSRD. Future research can investigate whether new standards have brought consistency and comparability to reporting and thus compare companies and their reports. A future research question could be, for example:

> RQ: Has the EU Corporate Sustainability Reporting Directive increased comparability among companies in sustainability reporting?

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Appendices

Appendix 1. List of research data

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