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Analyses for a company's climate transition plan

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Tiivistelmä

Euroopan unionin kestävän kehityksen raportointidirektiivi (CSRD) astui voimaan vuoden 2023 alussa. CSRD:n kestävän kehityksen raportoinnille asettamat vaatimukset on kuvattu European Sustainability Reporting Standards (ESRS) -standardissa. Yksi tärkeimmistä standardeista CSRD:ssä on Ilmastostandardi, ESRS E1. Tämä standardi selittää yksityiskohtaisesti erilaiset tiedonantovaatimukset, jotka hahmottelevat kaikki tiedot, jotka yrityksen tulisi julkistaa vastuullisuusraportissaan. Yksi sen julkistamisvaatimuksista on E1-1, ilmastonmuutoksen hillintää koskeva siirtymäsuunnitelma.

CSRD:n myötä myös monien yritysten on alettava raportoida kestävän kehityksen kysymyksistä ja laadittava oma ilmastonmuutoksen hillintää koskeva siirtymäsuunnitelma. Näihin yrityksiin kuuluu myös Etteplan. Etteplan on teknologiapalveluyritys, jonka asiakkaat ovat teollisuusyrityksiä. Etteplanin ilmastosiirtymäsuunnitelman tekemisessä mahdollisesti hyödynnettäväksi tehtiin päästövähennys- ja kustannustehokkuusarvioita. Ne koskivat yrityksen liisaamia ajoneuvoja, sen toimistojen ostamaa energiaa ja sen työntekijöiden työmatkoja. Nämä laskennalliset arviot ja Etteplanin omat ilmastonmuutoksen hillintää koskevan siirtymäsuunnitelman laskelmat ovat kuitenkin erillisiä; näissä käytetyt laskentatiedot, laskentayhtälöt ja saadut tulokset voivat poiketa huomattavasti toisistaan.

Arvioissa käytetyt tiedot olivat suurimmaksi osaksi Etteplanin jo kokoamia hiilijalanjälkilaskelmia. Toimistoenergian kustannusarvioihin käytettiin Internet-lähteitä. Liisattujen autojen osalta päästövähennyspotentiaaliksi arvioitiin 62 tCO2eq ja kustannusarvioksi nolla; toimistojen vaihtamisessa vihreään energiaan päästövähennyspotentiaaliksi arvioitiin 229 tCO2eq ja kustannusarvioksi 291-1973 euroa ylimääräistä vuodessa verrattuna uusiutumattoman energian käyttöön; toimistojen vaihtamisessa LED-valaistukseen päästövähennyspotentiaaliksi arvioitiin 38 tCO2eq ja kustannusarvioksi nolla; työmatkakulkemisen päästöpotentiaaliksi arvioitiin 1 106 tCO2eq mutta sen kustannuksista ei tehty arviota. Arviot ovat melko epämääräisiä, mutta tulevaisuudessa, kun yritys pystyy tunnistamaan konkreettisempia toimenpiteitä, voidaan tuottaa tarkempia arvioita.

Avainsanat (asiasanat)

Kestävyysraportointidirektiivi, Greenhouse Gas Protocol

Muut tiedot (salassa pidettävät liitteet)

Liitteet 1-5 ovat salassa pidettäviä, ja ne on poistettu julkisesta työstä. Salassapidon peruste on Julkisuuslain 621/1999 24§, kohta 17, yrityksen liike- tai ammattisalaisuus. Salassapitoaika on kymmenen (10) vuotta, salassapito päättyy 30.5.2035

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Abstract

European Union's Corporate Sustainability Reporting Directive (CSRD) came into force at the beginning of 2023. The requirements set by the CSRD for sustainability reporting are described in the European Sustainability Reporting Standards (ESRS). One of the most important standards in the CSRD is the Climate Standard, ESRS E1. This standard explains in detail the different disclosure requirements that outline all the information that a company should disclose in its sustainability report. One of its disclosure requirements is E1-1, the Transition Plan for Climate Change Mitigation.

With CSRD, therefore, many companies must also start reporting on sustainability issues and produce their own transition plan for climate change mitigation. These companies also include Etteplan. Etteplan is a technology service company whose customers are industrial companies. To be potentially used in making the climate transition plan for Etteplan, emission reduction and cost-effectiveness estimates were made. They concerned the vehicles leased by the company, the energy purchased by its offices, and the commuting of its employees. The calculated estimates are separate from those that Etteplan used in their transition plan for climate change mitigation; the calculation data used, the calculation equations and the results obtained may differ significantly.

The data used in the estimates was mostly carbon footprint calculations already gathered by Etteplan. Those calculations were made according to the GHG Protocol. For the cost estimations for the office energy Internet sources were used. For leased vehicles, the emission reduction potential was estimated to be 62 tCO2eq and cost estimate was zero; for switching offices to green energy, the emission reduction potential was estimated to be 229 tCO2eq and cost estimation was 291-1973 euros extra per annum compared to using non-renewable energy; for switching offices to LED lighting, the emission reduction potential was estimated to be 38 tCO2eq and cost estimation was zero; for commuting, the emission reduction potential was estimated to be 1106 tCO2eq and cost was not estimated. The estimations are quite vague, but in the future, once the company can identify more concrete measures, more precise estimations can be produced.

Keywords/tags (subjects)

Corporate sustainability reporting directive, Greenhouse Gas Protocol

Miscellaneous (Confidential information)

The appendices 1-5 are confidential and have been removed from the published work. The basis for confidentiality is Section 24, Section 17 of the Publicity Act 621/1999, the business or professional secret of the company. Confidentiality period is ten (10) years, secrecy ends 30.5.2035

Table of Contents

Figures

Tables

1 Introduction

At the beginning of 2023, the European Union's Sustainability Reporting Directive (CSRD) came into force. With its entry into force, the number of companies required to report not only financial statements but also sustainability data expanded significantly. The requirements set by the CSRD for sustainability reporting are described in the European Sustainability Reporting Standards (ESRS). The CSRD's key objective is to raise corporate sustainability information to the same status as corporate accounting information in terms of significance. With CSRD, sustainability information is subject to the same quality requirements and responsibilities as financial statements reported by companies. (Niskala & Palmuaro 2023, 4-5.) Under the Directive, reporting of sustainability information will be required from large companies, small and medium-sized enterprises whose securities are admitted to trading on a regulated market in the Union, and parent companies of large groups (Commission Delegated Regulation 2023, 1). The directive can be seen as a reflection of the increasing emphasis placed on sustainability aspects, at least in the European Union today.

Since the Sustainability Reporting Directive only came into force very recently, it does not appear that there have been any sustainability reports produced yet that fulfill the requirements of CSRD. At least Klossner (2024) expects the first sustainability reports that align with CSRD to be available at the beginning of 2025 from companies that in the past have been obligated by NFRD (Non-Financial Reporting Directive) to report sustainability issues, among these the Finnish bank OP. Fortum mentions in its quarterly report that it has sent its transition plan and climate change targets to SBTi to be validated (Fortum Osavuosikatsaus Tammi-syyskuu 2024 [Fortum interim report January-September 2024]2024), and since the transition plan is part of the requirements of CSRD, it seems likely that Fortum will also publish its CSRD aligning sustainability report in 2025.

One of the most important sustainability reporting standards is the Climate Standard. This standard explains in detail the different disclosure requirements that outline all the information that a company should disclose in its sustainability report in order for the reader of the sustainability report to be able to understand the impact of the company's actions on climate change (Commission Delegated Regulation 2023, 73). The standard is based on the company's plans and capabilities to

adapt its strategy and business model so that they are compatible with the transition to a sustainable economy and contribute to climate change mitigation. The standard requires disclosure of the company's measures to prevent, mitigate or correct its actual or even purely potential negative effects under the duty of care. (Niskala & Palmuaro 2023, 104.)

One of the disclosure requirements of the Climate Standard, E1-1, is the Transition Plan for Climate Change Mitigation. This plan requires a wide range of disclosures, including an explanation of how the company's greenhouse gas reduction targets are consistent with limiting global warming to 1,5°C, as well as an explanation of the means of decarbonisation and the key planned actions the company has in place to achieve this. (Commission Delegated Regulation 2023, 75.)

With CSRD, therefore, many companies must also start reporting on sustainability issues and produce their own climate change mitigation transition plan. These companies also include Etteplan. Etteplan is a technology service company whose customers are industrial companies (Etteplan n.d). Strictly speaking, Etteplan is a corporation whose parent company is Etteplan Oyj. The company is a Finnish public limited company and its domicile is Espoo. (Talouskatsaus 2022 [Economy review] n.d, 14.) It was founded in 1983 (Etteplanin historia [History of Etteplan] n.d), and apart from Finland, it also has offices in Sweden, the Netherlands, Germany, Poland, Denmark and China, as well as a sales office in USA (Etteplan n.d).

The objective of this thesis was to produce emission reduction and cost-effectiveness estimates for selected emission categories for Etteplan's use in creating their transition plan for climate change mitigation. The plan was intended to comply with the guidelines of the European Union's Sustainability Reporting Directive (CSRD). The emission categories for which emission reduction and cost-effectiveness estimates were made in connection with this work were the vehicles leased by the company, the energy purchased by the offices, and the commuting of employees. However, while these calculations were made for Etteplan’s use, they are separate from the calculations Etteplan eventually used in their transition plan for climate change mitigation. All in all, there may be significant differences between the initial data, equations and results of this thesis and Etteplan’s climate transition plan.

In terms of sustainability reporting, the topic of the thesis was limited to the transition plan for climate change mitigation and the included emission estimates, and in terms of emission estimates to only those three aforementioned categories. The transition plan itself, not to mention the sustainability reporting required of the company as a whole, will include much more, but within the length of this thesis it made sense to limit the work to looking at only these emission and impact assessments.

2 Study/research design

2.1 Research questions, scope and limitations

At the beginning, the research questions chosen for this thesis were: How great an impact do the chosen emission reduction measures have? What is the cost effect of these measures? The actual measures were not yet decided on at this point, but it was decided that this thesis would focus on analyzing the impact of the measures concerning the vehicles leased by the company (Scope 1), the energy purchased by the offices (Scope 2), and the commuting of employees (Scope 3). That is to say, the impacts concerning other Scope 3 categories were left out of the scope of this thesis, even though they, too, could have been useful for Etteplan in creating their own similar calculations for their climate transition plan. This decision was made with the aim of keeping the extent of the work needed for this thesis within reasonable limits in terms of time and workload.

In the end, measures chosen were: switching combustion engine cars to electric cars (Scope 1), switching electricity in offices to certified electricity (Scope 2), using LED-lights in offices (Scope 2), and remote working and commuting in such a way that wouldn’t cause emissions (Scope 3). Estimated costs and emission reduction potential for each of the measures were assessed in the making of this thesis, though only in the case of switching to certified electricity in the offices the analysis was the cost estimated thoroughly.

2.2 Limitations on the literature review

It was decided that this thesis would cover a general outline of what CSRD is and that the thesis would go into more detail in the case of the ESRS 1 Climate change, and especially the transition plan for climate change mitigation that is one of the Disclosure Requirements of the ESRS 1. The

reasoning behind this decision was that as the estimates were to be done in such a way that Etteplan could make use of them in creating their climate transition plan, it would be logical to explain what the demands for the transition plan as required by CSRD were. Transition plans from different companies would have been included had there been available any that are compatible with CSRD. Since CSRD has gone into force so recently, at the time of writing this thesis, there didn't seem to be any to be found, though it is possible that some were published during the time the final touches were being put on this thesis.

Explaining in detail about sustainability reporting in general, politics linked with the emergence of sustainability reporting or other background of sustainability reporting was deliberately excluded, since other people had already covered these topics in their theses, such as Kontteli (2023), Sarja (2024) and Peltomäki (2024), respectively. It seemed that the transition plan as demanded by CSRD had not been a focal point of any thesis at that point, so it made sense to make it the focus of the literature review of this thesis. A short explanation of what GHG Protocol Standard is was included, since it may make it a bit clearer to the reader how the carbon footprint data that was used in the calculations for this thesis was originally calculated.

2.3 Research methods and analysis methods

The data that was used in calculating the emission reduction estimates were compiled by Etteplan prior to the making of this thesis. The data consisted of the carbon footprint calculations made for Etteplan in 2022 and 2023. They were calculated based on the Greenhouse Gas Protocol standard. The calculations cover the emissions from Etteplan's own operations (Scope 1 and 2) as well as from the value chain (Scope 3) in Finland and Sweden. (Heikinmaa, Styrman & Mattinen-Yuryev 2024.) As the details about the calculations and the data used to make them are confidential and thus not published in this thesis, this thesis contains no personal data of any kind.

This thesis is a case study. The purpose of case study is to understand and describe a phenomenon or object, but not to directly develop its function (Kehittämistutkimus tai -työ, toimintatutkimus ja case- eli tapaustutkimus [Developmental research or work, action research and case study] n.d). This research method was selected for this work because the objective of this work was rather to describe and understand the subject matter of the research, i.e. the company's emissions, and to provide estimates of the consequences of possible measures affecting the emissions, but not yet

put them into practice. The work was mainly carried out as quantitative research because the material of the work consists mainly of numbers.

The data for the thesis was analysed simply by calculating the impact of the measures on emissions, and how much these measures would cause costs. Microsoft Excel was used in making the calculations. For example, if the measure was buying electricity that was produced without any emissions, it would be analyzed how buying electricity with zero emissions would affect the total amount of the emissions from electricity. It would also be analyzed how much it would cost to use eco-friendly electricity. For this, information from the Internet pages of electricity companies in Finland was needed, so that an estimation of how much on average eco-friendly electricity costs could be made.

3 CSRD, Climate standard and transition plan

3.1 Corporate sustainability reporting directive (CSRD) of European Union

The European Union's Corporate Sustainability Reporting Directive (CSRD), which came into force at the beginning of 2023, establishes a mandatory reporting obligation for sustainability disclosures and extends corporate accountability to sustainability-related impacts, risks and opportunities. The directive is based on the European Green Deal and the transition to a climate-neutral and sustainable economy by 2050. (Niskala & Palmuaro 2023, 3, 13.) The idea behind sustainability reporting is that it enables companies to dispense reliable and comparable sustainability information to financial market participants and other stakeholders, such as their own personnel and customers (Niskala & Palmuaro 2023, 14-15). For companies, the reforms created by the directive will bring completely new actions and additional work, but also new perspectives for examining one's own impact. (Kuparinen 2023.)

Sustainability reporting is therefore expected to contribute to companies' access to financial capital and the identification and control of the company's own risks, which in turn helps to generate a competitive advantage by promoting the sustainability transition. The new requirements that came into force with the CSRD aim to raise the recognition, calculation and disclosure of corporate sustainability data to the same level as corporate financial reporting. (Niskala & Palmuaro 2023,

14-15.) The increasing transparency that comes with the sustainability reporting may also prevent greenwashing (Kuparinen 2023).

As such, sustainability reporting is nothing new. In the past, corporate sustainability reporting has been voluntary responsibility reporting, and the current CSRD is based on it and the reporting frameworks that guided previous reporting. These include the GRI standard set by the Global Reporting Initiative (GRI), the Integrated Reporting Framework, the industry-specific standards of the Sustainability Accounting Standards Board (SASB), and the TCFD recommendation on climate-related financial disclosures. (Niskala & Palmuaro 2023, 14, 16, 17.)

CSRD also extends the Taxonomy Regulation to all the companies that belong under the CSRD. The Taxonomy Regulation is a classification system of EU for sustainable economic actions. With the Taxonomy Regulation, EU seeks to determine uniform, science-based environmental sustainability evaluation criteria for investments. Before the CSRD came into effect, the Taxonomy Regulation applied only to public interest companies that employed over 500 people. (Niskala & Palmuaro 2023, 26.)

The Sustainability Reporting Directive imposes an obligation on companies to report quantified sustainability data. The detailed content of these, in turn, is defined in the sustainability reporting standards issued by the European Commission as regulations. CSRD obliges companies to report relevant indicator data on adverse sustainability impacts and taxonomy data as part of the sustainability report incorporated in the company's Board of Directors' report, which is attached to the company's financial statements. The financial statements, on the other hand, concern the company's profit and financial position. The CSRD also requires that the sustainability report has to be published in digital format. This is intended to improve access to information. The sustainability reports aim to steer capital flows towards sustainable targets in line with the EU's climate and environmental goals. (Niskala & Palmuaro 2023, 30-31.) Publishing sustainability information in open digital database will make reviewing them easier for the interest groups (Kuparinen 2023).

Subject to the CSRD are not only large undertakings, but also small and medium-sized undertakings with securities admitted to trading on the EU regulated markets, as well as parent undertak-

ings of large groups. The directive comes to force gradually, so that the sustainability reporting under the directive will start in 2024 at the earliest, but by 2028 it will be extended to all companies that are subject to the CSRD. (Niskala & Palmuaro 2023, 32-33.)

A key objective of the Sustainability Reporting Directive is to have standardised, consistent and coherent data available on the activities of companies operating in the EU covering a wide range of sustainability impacts (Niskala & Palmuaro 2023, 42). There are twelve sustainability reporting standards (ESRS), and they apply to all industries. The standards define what a company can report on each sustainability theme and what methods a company should use to carry out this reporting. Of all 12 standards, only ESRS 2 is mandatory for all companies within the scope. A company will report according to the other standards only if the company deems that it has key impacts on the sustainability themes of a given standard. In 2026, industry-specific reporting standards are still to be published, which will define what data each company in a particular industry needs to report. (Kuparinen 2023.)

Projects are also underway in other parts of the world than the European Union to harmonise sustainability reporting. At a global level, this is done by the International Sustainability Standards Board (ISSB) under the IFRS Foundation, and the Securities Exchange Commission (SEC) in the United States. Efforts have been made to create European sustainability standards in such a way as to align as closely as possible with IFRS Foundation's global standards, to avoid double reporting, and to achieve genuine global comparability. On the other hand, European standards have been desired to be in line with the EU's Green Deal. (Niskala & Palmuaro 2023, 44.)

According to the CSRD, the sustainability data of the sustainability statement must be verified by an external, independent certifier. The transition to verification is gradual, but the ultimate goal is that sustainability reporting will eventually be subject to the same level of assurance as financial reporting today. It is up to the EU Member States to determine who can act as a certification authority in a Member State. (Niskala & Palmuaro 2023, 44, 45.)

Sustainability information must be available on the company's website, in addition to which the annual report must be prepared in electronic and machine-readable format. Sustainability data shall also be marked with identifiers used in the electronic reporting format. (Niskala & Palmuaro

2023, 45.) CSRD also sets quality standards for sustainability data. In order for information to be considered reliable, it must contain everything necessary for a correct understanding and be neutral and error-free. In order for sustainability data to also be comparable, the data must be consistently compiled year after year, in addition to achieving comparability with other communities and also between industries. Sustainability information is considered comprehensible when it is clear and concise. (Niskala & Palmuaro 2023, 47.)

The Sustainability Reporting Directive requires a company to report data on a double materiality basis. Double materiality means that, in addition to the financial materiality familiar from financial reporting, the materiality of the impact must also be taken into account in reporting. A matter may be essential to the community, either on the basis of one or both. The directive also includes a duty of care, i.e. due diligence. This means that the company must have a processed, holistic approach to detecting, handling, mitigating and preventing adverse sustainability impacts. (Niskala & Palmuaro 2023, 48- 49.)

With CSRD, companies must also report material sustainability impacts from business transactions and business relationships upstream and downstream. This is new compared to financial reporting and extends the scope of reporting to include the transactions of companies that are not directly applying CSRD themselves. If necessary, i.e. if the essential transactions and impacts of the value chain extend there, the review should also extend outside the EU. For many companies and industries, much of the emissions are generated outside of their own operations, so including the impact of transactions in the value chain in reporting is also very important to give a true picture of the effect of the company's operations. If all the necessary information for reporting is not available, value chain reporting is given relief for the first year of drafting. The company must provide information in the short, medium and long term. (Niskala & Palmuaro 2023, 49.)

The Sustainability Reporting Directive will only become binding once it has been implemented nationally, but the ESRS sustainability reporting standards will enter into force as such without national implementation. The national implementation outlines, among other things, who certifies sustainability reporting and what kind of sanctions are involved in failing to comply with sustainability reporting obligations. (Niskala & Palmuaro 2023, 51.)

3.2 ESRS E1 Climate Change

The aim of the European Union standard ESRS E1 Climate Change is to explain in detail the different disclosure requirements that should allow the reader of sustainability statements to understand the effect of a company's actions on climate change. The effects should be reported regardless of whether they are positive, negative, or just possible effects. One of the goals of the standard is also that through disclosure requirements, the sustainability statement reader will learn how the company's mitigation efforts - past, present and future - align with the aim of the Paris Agreement, that is, restricting global warming to 1,5 degrees Celsius. (Commission Delegated Regulation 2023, 73.) The view of Niskala and Palmuaro (2023) is that the standard is based on the company's plans and capabilities to adapt its strategy and business model so that they are compatible with the transition to a sustainable economy and take part in mitigating climate change. They also point out that the standard requires disclosure of the company's measures to avert, lighten or correct its actual or even merely potential negative impacts under the duty of care. (Niskala & Palmuaro 2023, 104.)

The standard divides different disclosure requirements into four categories: Governance (GOV), Strategy (SBM), Impact, Risk and Opportunity Management (IRO), and Indicators and Targets (MT) (Niskala & Palmuaro 2023, 104). The metrics and targets category contains the largest number of different disclosure requirements. The climate standard also includes Appendix A: Application requirements. There are several application requirements for each disclosure requirement. (Commission Delegated Regulation 2023, 72-73.) The application requirements are instructions or further requirements for the Disclosure Requirements; they go into more detail about the subject of their respective Disclosure Requirements.

The importance of the climate change standard is probably indicated by the fact that at least according to Niskala and Palmuaro (2023), it was originally intended to be mandatory for all companies. However, they note that in the end it was concluded that if a company considers a two-way materiality assessment to justify that climate change is not an essential topic in its own operations and for those upstream and downstream in its value chain, the company may omit disclosure requirements required by the climate standard. In this case, however, the company must provide a

detailed explanation of the conclusions of the materiality assessment on climate change and justify why climate change is not a material sustainability issue from the perspective of the impacts, risks and opportunities of the company's operations. (Niskala & Palmuaro 2023, 105.)

3.3 E1-1 Transition plan for climate change mitigation

Perhaps the most important climate standard disclosure requirement can be considered to be climate standard Disclosure Requirement E1-1, Transition plan for climate change mitigation. The intention of this particular Disclosure Requirement is to obtain information about what exactly the company's mitigation efforts are - past, current and future - to make sure its strategy and business model are in accordance with the transition to sustainable economy, and restricting the global warming to 1,5 degrees Celsius and with objective of attaining climate neutrality by 2050. Also, where relevant, the company should also explain whether it is exposed to coal, oil and/or gas-related activities. (Commission Delegated Regulation 2023, 75.) According to Heuss (2024), a transition plan in practice requires a company's carbon footprint as a basis.

According to the Disclosure Requirement, the plan should include several different explanations. First, the plan should include an explanation of how the company's GHG emission targets are compatible with restricting global warming to 1,5 Degrees Celsius. This explanation has to refer to GHG emission reduction targets outlined in another Disclosure Requirement of the ESRS E1, Disclosure Requirement E1-4. (Commission Delegated Regulation 2023, 75.) According to Application Requirement 2, the emission reduction target should be compared to a pathway to 1,5 Degrees Celsius. This reference value, to which the reduction target should be compared, should be founded on either a sectoral decarbonization pathway, if the sector the company belongs to has such, or an economy-wide scenario. The economy-wide scenario should be understood to be a simple conversion of emission reduction aims from the state to company level. (Commission Delegated Regulation 2023, 86.)

Another explanation that the climate transition plan should include is an account of the decarbonisation levers the company has identified for itself and what key actions the company has planned. These should refer to the GHG emission reduction targets that are demanded by E1-4 and the climate change mitigation actions that are demanded by E1-3. Key actions include changes in the company's products and services, adoption of new technologies in the company's own operations

or value chain, regardless whether upstream and downstream. (Commission Delegated Regulation 2023, 75.) Decarbonization levers are the tools and mechanisms that companies use to reduce their emissions (Scope 1 Emissions: An Explainer Guide n.d).

The transition plan should also include an account and quantification of the company's investments and funding which support the implementation of the transition plan. The explanation should refer to the climate change mitigation actions as required in E1-3. It should also refer to the key performance indicators of capital expenditure aligned with taxonomy and, where relevant, the capital expenditure plans. (Commission Delegated Regulation 2023, 75.)

There should also be a qualitative evaluation of the potential locked-in GHG emissions caused by the company's key assets and products as a part of the climate transition plan. The assessment has to include an account of if and how these emissions may jeopardize reaching the company's GHG emission reduction targets and cause transition risk. If applicable, the assessment should also include an explanation of what the company's plans to manage its GHG-intensive and energy-intensive assets and products are. (Commission Delegated Regulation 2023, 75.) According to Application requirement 3, the key assets are assets that are either owned or controlled by the company, and they comprise of both existing and planned assets that are a cause of significant direct or indirect GHG emissions. The assets may be for example stationary or mobile installations, facilities, or equipment. The assets are considered as firmly planned if the company will most likely deploy them within the next 5 years. Also, if the company has recognized the Scope 3 category "use of sold products" as meaningful under Disclosure Requirement E1-6, the company may consider disclosing the locked-in emissions caused directly by the use-phase of the products the company has sold. (Commission Delegated Regulation 2023, 86.)

If the company has economic activities which are covered by delegated regulations on climate adaptation or mitigation under the Taxonomy Regulation, it should give an account of any aim or plans, such as capital expenditure, capital expenditure plans, or operating expense, which the company has for adhering its economic activities, such as revenues, capital expenditure, or operating expense, with the criteria that are included in Commission Delegated Regulation 2021/2139(29) (Commission Delegated Regulation 2023, 75.)

The climate transition plan also has to include an account of significant capital expenditure amounts that the company has invested during the reporting period related to coal, oil, or gas-related economic activities (if applicable to the company). A disclosure whether the company is excluded from the EU Paris-aligned Benchmarks is also a compulsory part of the transition plan, as well as a description of how the transition plan is included in the company's overall business strategy and financial planning. The transition plan also should include an account of if the transition plan is accepted by the administrative, management and supervisory bodies of the company as well as an account of how the company is making progress in the application of the transition plan. If the company doesn't have a transition plan yet, it should tell if and at which time it will begin following a transition plan. (Commission Delegated Regulation 2023, 76.)

3.4 Disclosure Requirements E1-3, E1-4 and E1-6

Two of the other Disclosure Requirements of ESRS1 are mentioned in the Disclosure Requirement E1-1. These are Disclosure Requirement E1-3 and Disclosure Requirement E1-4. The Disclosure requirement E1- 3 requires the company to state its climate change mitigation and adaptation actions, as well as what resources it has apportioned for their application. The account of the actions and resources should abide by the principles described in ESRS 2 MDR-A *Actions and resources in relation to material sustainability matters*. The company also has to declare the climate change alleviation actions by decarbonization levers, encompassing also solutions that are based in nature, as it lists its key actions that have either been taken in the reporting year or that have been prepared for the future. When the company describes the end result of its actions for climate change mitigation, it also has to include the GHG emission reductions that the company has achieved or is expecting to achieve. The company also has to:

> *relate significant monetary amounts of CapEx and OpEx required to implement the actions taken or planned to:*
>
> *i.the relevant line items or notes in the financial statements;*
>
> *ii.the key performance indicators required under Commission Delegated Regulation (EU) 2021/2178; and*
>
> *iii.if applicable, the CapEx plan required by Commission Delegated Regulation (EU) 2021/2178 . (Commission Delegated Regulation 2023, 77.)*

On the other hand, E1-4 requires the company to state its climate related targets. The disclosure of the targets should include the information required in ESRS 2 MDR-T *Tracking effectiveness of policies and actions through targets*. Apart from its GHG emissions reduction targets, the company also has to disclose any other targets that it has to control significant climate-related impacts, risks, or opportunities. These other targets can for example be utilizing renewable energy, increasing energy efficiency, adapting to climate change, and mitigating physical or transition risk(s). (Commission Delegated Regulation 2023, 78.)

According to E1-4, the company has to state its GHG emission reduction targets in absolute value. This has to be done either in tonnes of CO2eq or as a percentage of the emissions of a base year. If applicable, the GHG emission targets intensity value also has to be disclosed. (Commission Delegated Regulation 2023, 78.) According to Application Requirement 23, intensity values are ratios of GHG emissions relative to unit of either physical activity or economic output. The relevant units are explained in ESRS sector-specific standards. (Commission Delegated Regulation 2023, 91.) As of the writing of this thesis, it would appear that these sector-specific standards have not yet been published (Hannay 2024).

The targets have to be stated for Scope 1, 2 and 3 GHG emissions. They can be stated either separately or combined, but if they are stated combined, the company has to make clear which GHG emission Scopes are covered by the target, what is the share belonging to each respective Scope, and which GHGs are included. The company has to disclose how it ensures the consistency of its GHG emission targets with its GHG inventory boundaries (as required by Disclosure Requirement E1-6). The GHG emission targets will have to be gross targets. This means that the company cannot use GHG removals, carbon credits or averted emissions as ways of reaching the targets. (Commission Delegated Regulation 2023, 78.)

The company has to state what its base year is currently, and what its baseline value is. From year 2030 onwards, the company has to revise the base year for its GHG emission reduction targets after every five years. If the company so chooses, it can state how it has made progress in the past in reaching its targets preceding its present base year if this information is in accordance with the requirements of the Standard. (Commission Delegated Regulation 2023, 78.)

According to Application Requirement 25, the company has to briefly disclose how it has made sure that the baseline value is representative with respect to the activities that it covers, and the influences caused by external factors. These influences can for example be temperature anomalies in a certain year. Temperature anomalies can affect how much energy is consumed and thus also GHG emissions associated with energy consumption. The ensuring of the baseline value can be achieved by normalizing the baseline value or deriving the baseline value from a 3-year average, provided this makes the value more representative. The baseline value and the baseline year should not be substituted apart from if there are significant changes in the target or reporting boundary. (Commission Delegated Regulation 2023, 92.)

According to E1-4: ”GHG emission reduction targets that the company has set have to include at least target values for the year 2030 and, if available, for the year 2050. From 2030, target values have to be reset after every 5-year period” (Commission Delegated Regulation 2023, 78). The GHG emission reduction targets can be presented along with the climate change mitigation actions of the company as a table or graphical pathway that shows progressions as they occur over time (Commission Delegated Regulation 2023, 93). Beneath is a Figure that shows an example of how to do this in the form of graphical pathway.

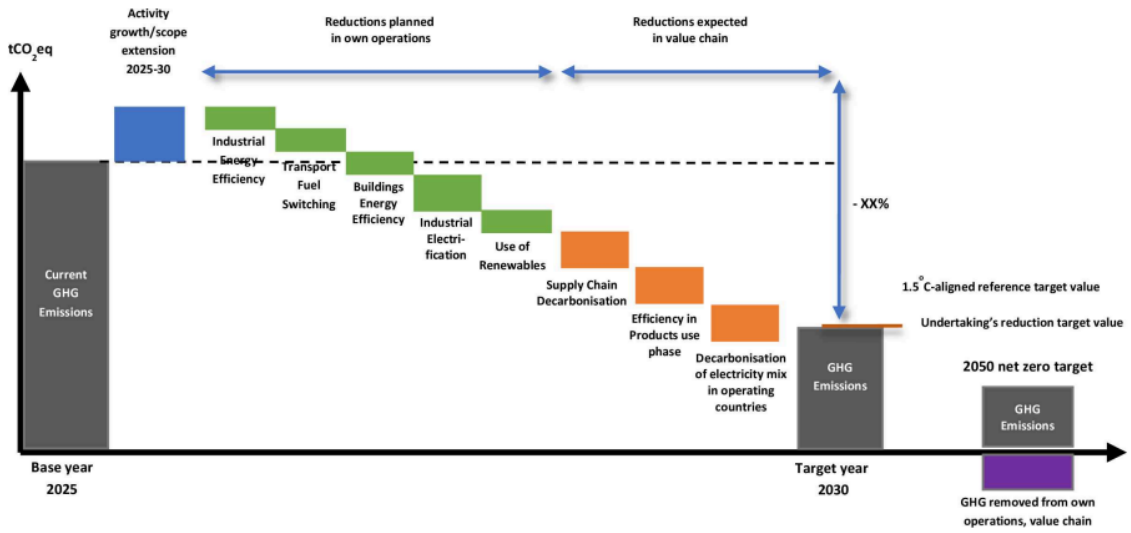

Figure 1. An instance of how GHG emission reduction targets can be presented along with the climate change mitigation actions (Commission Delegated Regulation 2023, 92)

The company has to disclose if its GHG emission reduction targets are scientific and congruent with restricting global warming to 1,5°C. The company has to explain which framework and methodology the company has used to establish the targets. The company also has to mention whether the targets have been derived by making use of a sectoral decarbonisation pathway. It also has to be disclosed which climate and policy scenarios underlie the targets and if the targets have been ascertained externally. (Commission Delegated Regulation 2023, 78.)

The company also has to give a short explanation about how it has considered future developments and how these may impact the company's emissions and emission reductions. Lastly, the company has to state its decarbonization levers and their part in succeeding in reaching the GHG emission targets. According to Application Requirement 30, the decarbonization levers and their estimated contributions to reaching the GHG emission reduction target have to be presented broken down by each Scope. The company also has to state if it plans to take into use new technologies and what part do these technologies play in reaching the emission reduction targets. The company also has to declare if and how it has appraised a wide variety of climate scenarios. These should include at the minimum a climate scenario that is accordant with restricting global warming to 1,5. The decarbonization levers can for example be being energy efficient or reducing consumption, switching fuels, using renewable energy, and discontinuing or replacing products and processes. (Commission Delegated Regulation 2023, 78.)

According to Application Requirement 26, the company has to state information regarding its GHG emission reduction targets by presenting the information over the target period with reference to an emission pathway. This pathway can be either a sector specific emission pathway, if such is available, or cross-sector emission pathway. In either case, the pathway has to conform to restricting global warming to 1,5 degrees Celsius. For this reason, the company has to compute a reference value that aligns with 1,5 degrees Celsius for Scope 1 and 2. If applicable, the company also has to calculate a separate reference target value for Scope 3. The company's own GHG emission reduction targets are compared to the reference target. According to Application Requirement 27, the reference target value can be computed by multiplying the GHG emissions in the base year with an emission reduction factor. The emission reduction factor can be either a sector specific emission reduction factor or a cross-sector emission factor. There are a variety of sources which the factors can be derived from; however, the company should be careful to be certain that the

source for the emission reduction factor is founded on an emission reduction pathway which is accordant with restricting global warming to 1,5 degrees. According to Application Requirement 28, the emission reduction factors are still in the process of being developed. Because of this, companies should use only updated information that is publicly available. (Commission Delegated Regulation 2023, 92.)

According to Application Requirement 29, since the reference target value depends on which year a company chooses as its base year and how great the emissions of the company are at the base year, the reference target value for companies with a newer base year or which baseline emissions are higher may find the reference target value easier to reach than those companies that have already taken great steps in the past in reducing their GHG emissions. Therefore, the latter companies are allowed to modify their baseline emissions correspondingly to establish the reference target value. However, if the company modifies the amount of its baseline emissions to decide the reference target value, it cannot take into account GHG emission reductions that predate 2020. It also has to provide evidence of its past reached GHG emission reductions. (Commission Delegated Regulation 2023, 93.)

Since the transition plan can be seen to require a carbon footprint of the company as a basis, the Disclosure Requirement E1-6 can be seen as relevant to the transition plan (Hess 2024). The Disclosure Requirement E1-6 *Gross Scopes 1, 2, 3 and Total GHG emissions* is based on the GHG Protocol standard. (Niskala & Palmuaro 2023, 109.) When calculating the emissions, either GHG protocol standard should be followed, or the ISO 14064-1:2018 standard. However, in the latter case, the company also has to follow the demands of the ESRS1. (Niskala & Palmuaro 2023, 109-110.)

The company has to state its gross emission of Scopes 1-3 separately in metric tonnes of CO2eq, as well as the total GHG emissions. To measure the company's progress in reducing its GHG emissions, it is necessary to disclose the total GHG emissions of the company. Scope 1 GHG emissions are emissions that the company causes directly, the Scope 2 emissions are emissions that are caused by the company indirectly by the energy it consumes, regardless of whether it is purchased or acquired externally, and Scope 3 are emissions that emerge in the company's chain, either upstream or downstream. The information mentioned in this particular Disclosure Requirement is necessary also in comprehending the company's climate-related transition risks, especially the

Scope 3 GHG emissions, since they are an important cause of transition risks. (Commission Delegated Regulation 2023, 80.)

When disclosing the gross Scope 1 GHG emissions, the company has to disclose how many percent of the Scope 1 GHG emissions are from regulated emission trading schemes. On the other hand, in the disclosure of the Scope 2 GHG emissions, the company has to state both the gross location-based as well as the gross marked-based Scope 2 GHG emissions. When company discloses its total GHG emissions, it has to include a disaggregation which specifies the total GHG emissions derived from the Scope 2 GHG emissions that are measured using the location-based method, and those that are measured using the market-based method. (Commission Delegated Regulation 2023, 81.) The company has to state its GHG emissions intensity, that is, total GHG emissions per net revenue (Commission Delegated Regulation 2023, 82).

When the company discloses the information on its GHG emissions concerning its associates, joint ventures, unconsolidated subsidiaries and jointly controlled operations and assets, it should include the GHG emissions in accordance with the extent of its operational control over them. The Scope 1 and 2 emissions should be disclosed so that the emissions from the parent company and its subsidiaries are disclosed separately from the emissions of the company's investees. (Commission Delegated Regulation 2023, 81.)

3.5 Rest of the Disclosure Requirements

The rest of the Disclosure Requirements of ESRS 1 aren't as closely relevant to the transition plan as the aforementioned ones. Three of the Disclosure requirements in ESRS 1 Climate change have not been numbered. One of them is *Disclosure Requirement related to ESRS 2 SBM-3*. It requires that in the case of each material climate related risk that the company has determined, the company has to specify whether the risk is a physical risk or a transition risk. The company also has to provide a resilience analysis concerning its strategy and business model with respect to climate change. (Commission Delegated Regulation 2023, 76.)

The second unnumbered Disclosure Requirement is *Disclosure requirement related to ESRS 2 IRO-1*. It requires the company to give an explanation about how it identifies and assesses risks, im-

pacts and opportunities that are related to climate. The explanation has to include how the company assesses its impacts on climate change, especially its GHG emissions as demanded by Disclosure Requirement E1-6, how it identifies physical risks and transition risks that are related to climate in its operations and along its value chain, both up- and downstream. When company discloses these things, it should describe how it has made use of a climate-related scenario analysis, containing a variety of climate scenarios, to help in the determination and appraisal of short-, medium- and long-term physical risks and transition risks and opportunities. (Commission Delegated Regulation 2023,76-77.)

The last unnumbered Disclosure Requirement, named *Disclosure requirement related to ESRS 2 GOV-3*, requires the company to state if and how the payment of members of the administrative, management and supervisory bodies of the company takes into account considerations that are related to climate change. This disclosure should also include whether their performance has been evaluated against the GHG emission reduction targets that the E1-4 demands. (Commission Delegated Regulation 2023, 74.)

The rest of the Disclosure Requirements require the company to describe what policies it has established to manage its material impacts, risks, and opportunities associated with climate change mitigation and adaptation (E1-2), to provide data on its energy consumption, including its improvement in energy efficiency, exposure to coal, oil and gas-related activities (fossil fuels) and what is its share of renewable energy in its overall energy mix (E1-5), and to disclose the amount of its GHG removals and GHG mitigation projects it has financed using carbon credits (E1-7). (Commission Delegated Regulation 2023, 79) The company also has to disclose if it applies internal carbon pricing schemes and if it does, how they affect its decision making and encourage applying climate-related policies and targets (E1-8). Lastly, the company is required to state its anticipated financial effects from significant physical risks and transition risks. The company also has to state potential benefit from material climate-related opportunities (E1-9). (Commission Delegated Regulation 2023, 77-83.)

4 GHG protocol

The Greenhouse Gas Protocol is a global standard. It instructs how to assess and manage corporate greenhouse gas (GHG) emissions. It is divided into three scopes. (GHG Protocol: Scope 1 n.d.)

The standard originally covered the accounting and reporting of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. All are greenhouse gases. They were the gases covered by the Kyoto protocol. (The Greenhouse Gas Protocol n.d, 3.) Nowadays a greenhouse gas called nitrogen trifluoride is also included. (Corporate Standard Frequently Asked Questions n.d.) Kyoto Protocol was an international treaty which strived to reduce the emission of gases that play a part in causing climate change. It was replaced by the Paris Agreement. (Kyoto Protocol n.d)

Directly measuring the GHG emissions is uncommon. Instead, the GHG emissions are usually calculated by utilizing documented emission factors. These factors are: "-- calculated ratios relating GHG emissions to a proxy measure of activity at an emissions source". Often, it is possible to use fuel data to calculate accurate emissions data; for example, Scope 1 GHG emissions are often calculated based on how much commercial fuels have been purchased. (The Greenhouse Gas Protocol n.d, 42.) However, it is also possible to use distance instead of fuel data in calculating the emissions of vehicles (Scope 1 Emissions: An Explainer Guide n.d).

Scope 1 contains the direct GHG emissions that originate from sources that the company either owns or controls. These can be for instance emissions from boilers or vehicles. (The Greenhouse Gas Protocol n.d, 25.) Scope 2 is a category for indirect emissions. It contains the GHG emissions caused by, for example, the production of the electricity and heat that the company consumes. (GHG Protocol Scope 2 Guidance n.d, 34.) Other indirect emissions, on the other hand, belong to Scope 3. The indirect emissions which belong to Scope 3 result from the activities of the company, but they originate from sources that the company neither owns nor controls. It is not a mandatory reporting category. Scope 3 activities can for example be utilization of sold products or services. (The Greenhouse Gas Protocol n.d, 25.)

In order to calculate Scope 2 emissions, a way to determine the emissions caused by electricity consumption is needed. Two methods exist which have been used primarily to apportion the GHG emissions that occur when electricity is generated to the end consumers. They are called the location-based and market-based methods.

Emissions caused by sources of electricity that have been chosen deliberately are represented by the market-based method; the method reflects the choices a consumer makes in choosing an electricity supplier or product. The average emissions intensity of electricity grids, on the other hand, are represented by the location-based method. It is possible to apply the location-based method in any location. It is based on statistics about emissions and electricity output within a certain area during a certain time. In contrast, the market-based method utilizes a GHG emission factor. The emission factor is chosen according to the end consumer's electricity contract. Unlike the location-based method, market-based method doesn't necessarily represent the emissions originating from the company's energy consumption. Rather, it represents contractual information and claims flow. (GHG Protocol Scope 2 Guidance n.d, 25-26.)

In Scope 2 electricity emissions calculations, the most precise activity data may be provided by metered electricity consumption or utility bills. However, sometimes these may not be available. In cases like these, emissions can be estimated for example by allocating electricity usage in a building between all its tenants according to the square footage of the company's premises and the building's occupancy rate. (GHG Protocol Scope 2 Guidance n.d, 44) Scope 2 GHG emissions are typically calculated by using metered electricity consumption and emission factors that are either supplier-specific, specific to the local grid, or originating from other published sources. (The Greenhouse Gas Protocol n.d, 42)

Employee commuting category includes the emissions that are caused by employees when traveling from their homes to their workplace and vice versa. The emissions may originate from traveling by using autos, buses, rail etc. There are three different ways that the commuting emissions can be calculated: by fuel-based method, distance-based-method, or average-data method. In fuel-based method, the calculations involve the amount of fuel consumed during commuting and using the correct emission factor for the fuel in question. In the distance-based method, on the other hand, data about the commuting patterns of employees is utilized. The data can be for example the distance the employees travel and mode of travel they use for commuting; in this method, emission factors for the modes of travel are used. The last method, the average-data method, uses average data on commuting patterns to base the estimations about the emissions from employee commuting. (Technical Guidance for Calculating Scope 3 Emissions n.d, 87.) The equation for calculating the carbon dioxide emissions by using the average-data method is shown

below; the source of the equation is Technical Guidance for Calculating Scope 3 Emissions (n.d, 92), but its formulation has been modified; in the original equation, instead of calculating working weeks per year and working days per week separately, working days per year was used.

$$CO2\ emissions\ from\ employee\ commuting = a\ x\ b\ x\ c\ x\ 2x\ d_1 x\ d_2 \times e \qquad (1)$$

Where a = total number of employees

b= percentage of employees using mode of transport

c=one-way commuting distance (km)

d_1=working weeks per year

d_2=working days per week

e=emission factor of transport mode (kg/CO2e/km)

5 Research methods

Prior to the making of this thesis, the carbon footprint for Etteplan was calculated for the years 2022 and 2023 according to Greenhouse Gas Protocol standard. This work was done by an internal team of Etteplan's, the LCA team. The carbon footprint calculations cover Etteplan's emissions caused by its own operations as well as emissions originating from its value chain in Finland and Sweden. In other words, the carbon footprint calculations cover Scopes 1, 2 and 3. The market-based method was used to calculate the results. (Heikinmaa, Styrman & Mattinen-Yuryev 2024) Etteplan has offices also in other countries (Etteplan n.d), but at the time of writing of this thesis, they have not been included in the carbon footprint calculations.

Etteplan has set its emission reduction target for Scopes 1, 2 and 3. The target is to reduce their emissions by 42% by the year 2030. The base year which the emissions are compared to is 2022. This target is based on a Double Materiality assessment which was conducted in 2023, since it determined climate change as one of the material topics. (Etteplan's climate transition plan 2024) The Double Materiality assessment is required by CSRD (Niskala & Palmuaro 2023, 48- 49), and

since its conclusion is that climate change is one of the material topics, Etteplan has to take the Disclosure Requirements of ESRS 1 into account (Niskala & Palmuaro 2023, 105). The target is in line with SBTi (Science-based target initiative) cross-sector pathway for near-term emission reduction targets. Emission reduction of 42% is consistent with the level of decarbonization required to restrict worldwide temperature rise to 1,5°C in comparison to pre-industrial temperatures. (Etteplan climate transition plan 2024.) This means that the target is chosen according to the requirements of Disclosure Requirement E1-1 as well as Application Requirement 2.

In this thesis, emission reduction estimates, and for some categories, also cost-effectiveness estimates, were calculated or estimated. The calculations were made for several emission categories for Etteplan's use in creating their own calculations for transition plan for climate change mitigation. (The calculations made in this thesis and those made by Etteplan are not exactly the same; actually, the calculation data used, the calculation equations and the results obtained may differ significantly.) These selected emission categories were leased vehicles (Scope 1), energy consumed by the Etteplan offices (Scope 2) and commuting (Scope 3). The data compiled by Etteplan prior to the creation of this thesis, that was used originally in the 2022 and 2023 carbon footprint calculations, was used in the calculations for this thesis. The specific measures, which were formulated so that they could have been used as Etteplan’s key actions in the climate transition plan, for which the emission reduction estimates and cost-effectiveness estimations were calculated, were switching combustion engine cars to electric cars (Scope 1), switching electricity in offices to certified electricity (Scope 2), using LED-lights in offices (Scope 2), and remote working and commuting in such a way that wouldn’t cause emissions.

Several equations were used in calculating in the quantitative analyses. Apart from the equation used in making the calculations pertaining to commuting, which was presented in the previous Chapter, the equations were not taken from any specific source; rather, they are simple applications of common arithmetics. For the sake of clarity, they have been formulated in numerical form as equations instead of explaining in words only how the calculations have been made. For confidentiality reasons, quite a bit about the calculations is only explained in confidential appendices.

5.1 Leased cars (Scope 1)

Calculations for the measure for Scope 1, which was switching combustion engine cars to electric cars, were made using emission data of the leased cars used by Etteplan in Finland and Sweden in 2023. The amount of annual CO_2 emissions for the leased cars had been calculated previously by Etteplan's LCA team using how many kilometers the car had been driven in the year and the WLTP factor of the car (Heikinmaa, Styrman & Mattinen-Yuryev 2024).

First, emission target, e_{target} in the Table 1 below, was calculated for the Scope 1 emissions by using Equation 2 below. The target was set at –42% reduction in the emissions using year 2022 as the base year, and that is why emissions from leased cars in 2022, e_{2022}, was used in the calculation.

$$e_{target} = e_{2022} - 0{,}42 \times e_{2022} \qquad (2)$$

Where e_{target} = emission target for the Scope or category of the Scope

e_{2022} = emissions for the Scope or category of the Scope in 2022

The e_{2022} value used in the leased cars emission target calculation as well as the result of the calculation are shown in Table 1 below. After calculating the target for the emissions from leased cars, the cars were arranged from the greatest emitter to the smallest emitter. Then in the list of the emissions of the cars, the emissions were set to zero one by one, starting from the greatest emitter, until the sum of the emissions from the cars in both Finland and Sweden had lowered to the level of the target.

Table 1. Target for Scope 1 emissions

e_{2022} (tCO2eq)	140.3
e_{target} (tCO2eq)	81.4

The emission data of the leased cars is shown in confidential Appendix 1 in Table 1. Setting emissions from the car to zero represented it being switched to an electric car. The idea was that it would make sense to get rid of the greatest emitters first and leave those cars that already emitted the least.

The cost of switching some combustion engine cars to electric cars was estimated to be around zero. In estimating the cost of switching some leased combustion engine cars to electric cars, an assumption was made: while the lease rate of an electric car might be higher than a combustion engine car's, this would be offset by the lesser fuel costs of the electric car. Of course, this assumes that electricity costs will be lower than fuel costs in the future.

The emission reduction, e_r , for the leased cars was calculated using the Equation 3 below; the $e_{altered}$ in this case is the sum of the emissions from the cars in both Finland and Sweden after some of them have been switched to electric cars. The result of this calculation is shown in the Chapter 6.

$$e_r = e_{2022} - e_{altered} \qquad (3)$$

Where e_r=emission reduction

$e_{altered}$=emissions in a given Scope or category after the alterations were made to reduce the emissions

5.2 Commuting (Scope 3)

For Scope 3, the measures to be analyzed were remote working and commuting in such a way that wouldn't cause emissions. For both measures, a calculation how to reach the -42% emission target was made using the Equation 1 (presented in Chapter 4). The idea was that either one of these measures could be used, but that they wouldn't be used simultaneously. The first calculation studied the effect of the amount of working days at the office premises – in other words, the working days when the working was not done remotely, or when commuting was done in ways that cause emissions. The second calculation studied the effect of how many employees work at the office

premises, and how many work remotely. The assumption was that in this case, too, that for those employees who work at the office, commuting was done in ways that cause emissions. In effect, there is no difference in the calculations if people either work remotely or commute in a way that doesn't cause emissions, since in both cases, zero emissions are caused.

The emission target for Scope 3 category commuting, shown as e_{target} in confidential Appendix 2 in Table 2, was set at -42% of the 2022 commuting emissions, calculated using Equation 2. The emission target covers emissions from both Finland and Sweden. In confidential Appendix 2, Table 2 also shows the amount of emissions for Scope 3 category commuting in 2022, e_{2022}.

Detailed explanations about the commuting calculations and the data used in the calculations are presented in confidential Appendix 2. The emission reduction was calculated by using Equation 3. The result is presented in Chapter 6.

5.3 Switching to LED lighting (Scope 2)

Detailed explanations and data about the LED calculations are presented in the confidential Appendix 3. In this chapter, for confidentiality reasons, only the new equations used in making the calculations are shown.

Lighting takes about a third of the electricity consumed by the office (Toimistolaitteet [Office equipment] n.d). That is why the amount of emissions caused by office lighting was calculated by assuming it is third of the whole electricity emissions by the office. The amount of emissions from office lighting was calculated using the Equation 4 below; the result of this is shown in confidential Appendix 3.

$$e_l = \frac{1}{3} \times e_o \qquad (4)$$

Where e_l= emissions from lighting in the office

e_o = emissions from the office electricity

LEDs take only about half the amount of electricity (Näin vaihdat loisteputket led-putkiksi [This is how you change fluorescent tubes into led tubes] 2024; Sähkölaitteiden keskimääräinen sähkönkulutus [Average electricity consumption of electrical equipment] n.d), and thus produce only half the amount of emissions, of fluorescent lights. So how much emissions the offices without LEDs would produce if they were using LEDs was calculated by halving the amount of the office electricity emissions from the offices without LEDs. The amount of emissions of lighting produced by LEDs was calculated using Equation 5 below.

$$e_{l,LED} = \frac{1}{2} e_l \qquad (5)$$

Where $e_{l,LED}$ = emissions from LED lighting.

The results are shown in Table 8 in confidential Appendix 3. The result for the emission reduction, which was calculated using Equation 3 (presented in Chapter 5.1) is presented in Chapter 6. A rough cost estimation for switching to LEDs was made and was considered to be around zero; the assumption was that the cost of installing the LEDs would in the long run be offset by lower electricity costs.

5.4 Office energy (Scope 2)

In the carbon footprint calculations made prior to this thesis, purchased energy for offices was calculated using primary data. However, in the case of some premises, energy data was not available. In these cases, energy consumption was estimated based on floor area and average electricity consumption, both in Finland and Sweden. (Heikinmaa, Styrman & Mattinen-Yuryev 2024)

As to the electricity of the offices, the target for how much emissions there could be from office electricity, $e_{target,o}$ while reaching the -42% target for Scope 2, e_{target}, was calculated assuming, that the whole -42% reduction in emissions in Scope 2 would come from reductions in the emissions of office electricity. That means that there was an assumption that the emissions from district heating, e_h, and cooling, e_c, which also belong to Scope 2, would stay the same as in 2023. The effect of using LED lights was also taken into account when the target was calculated, by using $e_{r,LED}$ which

was the result of the LED lighting calculations presented in Chapter 5.3. Target for office electricity was calculated using Equation 6 below; the values used in the calculations can be seen in the Table 11 inconfidential Appendix 4. Since both LEDs and office electricity belong to the same Scope, the idea was that both measures would contribute in reaching the -42% target for Scope 2. That is the reason the equation below uses reductions from both LEDs and switching some office electricity to certified electricity.

$$e_{target,o} = e_{target} - e_h - e_c + e_{r,LED} \quad (6)$$

Where $e_{target,o}$ = emission target for office electricity

e_h= emissions from district heating

e_c= emissions from district cooling

$e_{r,LED}$= emission reduction of LED lighting

Then the offices were arranged from the greatest source of office electricity emissions to the smallest. The emission data used in this is shown in confidential Appendix 4 in Table 12. Then the emissions were set to zero one by one until the sum of the office emissions, $e_{altered,0}$ shown in the Table 11 in Appendix 4, went below the target. Emission reduction for the office electricity was calculated using the Equation 7 below, and the result is presented in Chapter 6.

$$e_{r,o} = e_{2022} - e_{altered,o} - e_h - e_c \quad (7)$$

Where $e_{r,o}$=emission reduction for office electricity

$e_{altered,o}$= office electricity emissions after the alterations

5.5 Estimations for the cost of green office electricity estimations

Some cost estimations enlightening how much more the electricity consumed by the office would cost if renewable energy was used were made. First, it was calculated how much electricity the offices that were chosen as those that should be switched from non-renewable electricity to renewable electricity, consumed in 2023. This can be seen in the Table 13 in confidential Appendix 5.

Then three electricity contracts that contained non-renewable energy sources were compared with three green electricity contracts. First, it was calculated how much a non-renewable electricity contract would cost on average, as well as how much green energy contract would cost on average. This can be seen in the Table 2 below and in Table 3 below.

Table 2. Values and results for the non-renewable electricity contract calculations

Non-renewable electricity	Fixed charge per month	Price per cent/kwh	Reference
Fortum yritys varma 24 months	5	8.09	Fortum Yritys Varma [Fortum Company Secure]. N.d
Helen yritykselle vakaasähkö 24 months	3.99	7.29	Määräaikainen Vakaasähkö [Temporary stable electricity] n.d.
Vattenfall yrityksen IlmastoMix 24 months	4.74	7.16	Sähkösopimus yritykselle [Electricity contract for the company] n.d
Average price	4.58	7.51	

Both the non-renewable and renewable contracts were specifically offered for companies, not to private households, and they covered a period of 24 months. The only exception to this is the renewable energy contract “Fortum vihreä lisäpalvelu”, which is an additional service. It is calculated below in Table 3 as the sum of the additional service and “Fortum yritys varma 24 months”.

Table 3. Values and results for the renewable electricity contract calculations

Renewable electricity	Fixed charge per month	Price per cent/kWh	Reference
Fortum vihreä lisäpalvelu+ Fortum yritys varma 24 months	9.99	8.87	Fortum Yritys Alkuperä [Fortum Company Origin] n.d
Helen vesisähkö 24 months	3.99	7.44	Määräaikainen Vesisähkö [Temporary water electricity] n.d
Vattenfall täystuuli 24 months	4.74	7.16	Sähkösopimus yritykselle [Electricity contract for the company] n.d
Average price	6.24	7.82	

Then it was calculated how much more it would cost to Etteplan if the amount of electricity consumed by the chosen offices were bought with a green contract versus if it was bought with non-renewable including contract. The result of this calculation can be seen in Table 14 in confidential Appendix 5. There was also some data available from an article from June of 2024 which contained how much additional price it cost if the consumer chose to buy their electricity with a green energy certificate. This data is shown in Table 4 below. Basically, this fixed monthly extra price on top

of the price from the electricity contract the consumer had would ensure that the customer's electricity would be 100% renewably produced. These additional services were presumably offered for private households (the source is unclear if these pertained also to companies), but they should give some indication how much these additional services would have cost to companies, as well. (Paljonko maksaa vihreä sähkösopimus ja puhtaampi omatunto kesäkuussa 2024?[How much will a green electricity contract and a cleaner conscience cost in June 2024?] 2024)

Table 4. Prices of the additional green electricity services (Paljonko maksaa vihreä sähkösopimus ja puhtaampi omatunto kesäkuussa 2024?[How much will a green electricity contract and a cleaner conscience cost in June 2024?] 2024, modified)

Name of the energy company	Name of the additional service	Extra price €/month
Aalto Energia	Tyyni EKO, 100 % uusiutuva	5.95
Nordic Green Energy	EKOenergia-sertifikaatti	2.99
Imatran Seudun Sähkö	Vuoksi-takuu	3.4
Vattenfall	100 % Täystuuli tai 100 % Täysvesi	4.9
Väre	100 % Uusiutuva	3.0

The average of these extra prices in Table 4 above was calculated, and how much it would cost annually. Then this amount was multiplied by the amount of offices in Finland and Sweden which

would be switched to green energy. These values are shown in confidential Appendix 5 in Table 15. The final result is presented in Chapter 6.

6 Results

As a result, estimations about emission reduction potential of the chosen measures (key actions) for Scopes 1, 2 and one of the Scope 3 categories, commuting, were calculated. There was also calculated a cost estimate for switching to using green energy in certain offices, as well as very rough cost estimates for switching some of the leased combustion engine cars to electric cars, and for switching to using LEDs. The results can be seen in Table 5 below.

Table 5. Measures and their cost estimates and emission reduction potentials

Number	Category	Measure (key action)	Cost estimate	Emission reduction potential (tCO2eq)
1	Scope 1 Leased vehicles	Switching combustion engine cars to electric cars	~0	62
2	Scope 2: Offices energy consumption	Switching electricity used in offices to certified electricity	291...1973 EUR/a	229
3	Scope 2: Offices energy consumption	Using LED lights	~0	38
4	Scope 3: Employee commuting	Remote working Using emissionless modes of transportation for commuting	n/a	1106

Details about how the emission reduction measures were achieved – that is, how many fossil fuel cars were switched to electric cars, how many offices were switched to green energy, and what exactly were the assumptions behind the LED calculations and commuting – are confidential information and are thus not included in this thesis. Since the results were deliberately calculated so that they would at least reach the target of –42% reduction compared to the emissions in the given Scope in 2022, all these reduction measures could be easily used in climate transition plan. The emission reduction potentials could be used as ways to reach the emission reduction target in a graphical pathway like one shown in Figure 1 in Chapter 3.4.

7 Conclusions and discussion

Research questions chosen for this thesis were: How great an impact do the chosen emission reduction measures have? What is the cost effect of these measures? The answer to the first question is, that the measures have deliberately been calculated so that they reach the –42% target within their Scope or within their category within a Scope that Etteplan has set for itself– at least in theory, as the actual impact of the measures in reality might differ from the estimations made in this thesis. The cost effect of these measures, on the other hand, is really assessed only in the case of switching some of the offices to certified energy. That assessment is quite conservative in nature, but it gives an idea how much extra using certified green energy might cost. The extra cost the use of green electricity might cause is not very great, so at least based on this estimation, switching to using certified energy wouldn't be very expensive.

The ESRS E1 Climate change requires that the emission reduction targets are consistent with restricting global warming to 1,5 Degrees Celsius. The emission reductions calculated for this thesis achieve this within their Scope or within their category within a Scope, since they are in accordance with Etteplan's emission reduction target. Etteplan has set a target to reduce its emissions from Scopes 1, 2 and 3 by 42% by 2030, compared to the base year of 2022. The target is also in line with SBTi (Science-based target initiative) cross-sector pathway for near-term emission reduction targets, so another ESRS requirements, that the emission reduction target should be benchmarked in relation to a pathway to 1,5 Degrees of Celsius, is also fulfilled in the case of the measures calculated for this thesis.

ESRS E1 Climate change requires an explanation of the decarbonisation levers the company has identified for itself and what key actions the company has planned. These should refer to the GHG emission reduction targets that are required by E1-4 and the climate change mitigation actions that are required by E1-3. This requirement is also fulfilled in the case of the key actions, since the measures for which the emission reductions have been calculated are also key actions and climate change mitigation actions.

The emission reduction calculations for the leased cars and switching offices to green energy are fairly reliable, since the carbon footprint data underlying them has been gathered from primary data. Since the commuting calculations and data are confidential information, their reliability cannot be commented on. The cost estimations for the leased electric cars and LED lights are very vague, the cost estimation for the extra cost caused by using green energy slightly less so, since it uses actual price data from multiple sources.

Good scientific practice has been followed in the making of the thesis. Among other things, I have labeled direct quotes in such a way that they are recognizable as such, i.e., I do not plagiarize. I have always tried to find the primary source of information instead of using a thesis, for example, where the primary source itself is mentioned, as the source. The source references have been marked in accordance with the reporting instructions. I would have preferred to have a wider array of sources for the literature review part of the thesis, but since CSRD entered into force so very recently, there didn't seem to be very many good sources to be found.

The ethical issues related to the thesis mainly concerned making sure that no confidential information ends up in the work, or if it does, I had to make sure that I conceal that information properly. I have complied with Etteplan's wishes concerning which information should be left unpublished in this thesis. The carbon footprint calculations material used as the basis for the calculations does not show people's personal data. In any case, I don't think applying the results of my research could have very serious ethical consequences. In order to ensure the validity of my work, I have endeavored to be as thorough and careful as possible in the use and analysis of the material I received.

The calculations and analyses produced for this thesis are quite simple, and since the data used to calculate them is not terribly specific, they are quite vague estimations. They should be considered to be directional only. Indeed, I think it can be said that at this point they show only the order of magnitude of the possible measures. There is also the fact to be considered that, in the case of Scope 3 emissions, it is unclear how much any company really can affect the commuting of its employees; after all, commuting is something that the employees are free to decide for themselves. Once more concrete measures can be identified, more precise estimations can be produced in the future.

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