DEVELOPING A FRAMEWORK FOR DEFINING AN ESG CONCEPT AND TARGETS IN A CONSTRUCTION PROJECT

Lappeenranta–Lahti University of Technology LUT

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ABSTRACT

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85 pages, 8 figures, 9 tables and 4 appendices

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Keywords: ESG, environmental social and governance, construction, sustainable construction, sustainability targets.

In this thesis, an ESG-based framework for identifying sustainability targets in new construction projects is created and tested by identifying sustainability targets for an industrial construction project to be constructed in Lappeenranta. The aim of the thesis is to answer the following research questions: What are the relevant ESG requirements to assess sustainability of a construction project and how are they measured; What are the potential ESG targets to be set for an industrial construction project. The building and construction industry does not currently have a common framework for identifying and setting sustainability targets for construction projects, so this thesis aims to fill this gap by developing the framework as well as testing it in a case project.

The framework developed in this study can be used as a basis for identifying the sustainability targets of a construction project in oral interviews with, for example, the building owner and user and project financier. The framework can be expanded and refined as necessary based on the project. With the framework, sustainability targets were identified across all ESG topics for an industrial construction project. The identified targets focus mostly on environmental sustainability, but several targets were identified in relation to social responsibility and governance as well. The building user and owner highlighted some of the same or similar targets. The financier, on the other hand, did not identify any targets for the project itself.

TIIVISTELMÄ

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Avainsanat: ESG, rakentaminen, vastuullinen rakentaminen, vastuullisuustavoitteet

Tässä diplomityössä luodaan ESG:hen pohjautuva viitekehys uudisrakennushankkeiden vastuullisuustavoitteiden tunnistamiseen, jota testataan Lappeenrantaan rakennettavan tuotanto- ja toimitilarakennuksen vastuullisuustavoitteiden tunnistamiseen. Työn tarkoituksena on vastata seuraaviin tutkimuskysymyksiin: Mitkä ovat rakennushankkeen vastuullisuuden arviointiin liittyvät ESG-vaatimukset ja miten niitä mitataan; Mitä ovat teollisuusrakennushankkeelle mahdollisesti asetettavat ESG-tavoitteet. Kiinteistö- ja rakennusalalla ei toistaiseksi ole olemassa yhtä yhtenäistä viitekehystä rakennushankkeiden vastuullisuustavoitteiden tunnistamiseen ja asettamiseen, joten työllä vastataan tähän tarpeeseen sekä luotu viitekehys testataan tarkoitukseensa toimivaksi.

Työssä luotu viitekehys soveltuu pohjaksi rakennushankkeen vastuullisuustavoitteiden tunnistamisen pohjaksi suullisiin haastatteluihin esimerkiksi rakennuksen omistajan ja käyttäjän sekä hankkeen rahoittajan kanssa. Viitekehys on hankkeen perusteella tarpeen mukaan laajennettavissa ja täsmennettävissä. Viitekehyksen pohjalta teollisuusrakennukselle tunnistettuja tavoitteita tunnistettiin liittyen kaikkiin ESG:n osa-alueisiin. Tunnistetut tavoitteet painottuvat ympäristövastuuseen, mutta useita tavoitteita tunnistettiin liittyen niin sosiaaliseen vastuuseen kuin hallintoonkin. Rakennuksen käyttäjä sekä omistaja painottivat osin samoja tai saman tyyppisiä tavoitteita. Rahoittaja puolestaan ei kohdistanut hankkeeseen liittyen lainkaan tavoitteita.

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SYMBOLS AND ABBREVIATIONS

Abbreviations

BDe	Biodiversity equivalent
BREEAM	Building Research Establishment Environmental Assessment Method
CO_2	Carbon dioxide
CPR	Construction Product Regulation
CSDDD	Corporate Sustainability Due Diligence Directive
CSRD	Corporate Sustainability Reporting Directive
EFRAG	European Financial Reporting Advisory Group
EPBD	Energy Efficiency of Buildings Directive
ESG	Environmental, social and governance
ESRS	European Sustainability Reporting Standards
EU	European Union
LEED	Leadership in Energy and Environmental Design
PDF*y	Potentially disappeared fraction of species over time
POP	Persistent organic pollutant
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
VSME	Voluntary Reporting Standards for Non-Listed SMEs

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DECLARATIONS

Turnitin

The originality of this thesis has been reviewed with the Turnitin similarity checking service.

AI usage

The author of the thesis, Kia Dillström, used the following AI-tools during the preparation of the thesis:

1. GraGPT
    a. Purpose of use: Creating the big picture and structuring of the thesis.
    b. Explanation of the use of the tool: Used to help structure the thesis and ideate suitable topics under certain chapters at the beginning of the thesis process.

Responsibility

The author, Kia Dillström, takes full responsibility for the content of this thesis and has reviewed and edited the content generated by the possible use of AI tools.

1 Introduction

The environmental impacts of buildings and construction are undeniably extensive and in need of change. Buildings and construction sector are responsible for a significant share of global emissions, waste production, raw material use as well as energy use (Nugent et al. 2022). The sector's emission reduction target for the year 2030 is currently out of reach and the sector is far from its net zero emissions by 2050 trajectory. The industry is in desperate need of better circular economy practises to prevent potentially viable materials from ending up in landfills and to hinder further depletion of natural resources and biodiversity of the world (UNEP 2025). While renewable energy is gaining momentum and increasing its share in the energy mix used by buildings, globally buildings still use mostly fossil-fuel-based energy, and more efforts are still needed to decrease both building energy consumption and the share of fossil fuels in the energy mix (IEA 2023).

Such as the environmental impacts, the social impacts of the industry are also significant. Construction industry employs a significant proportion of global population. The industry has a high demand for workforce and the long supply chains hide exploitation of workers and other human right violations (ILO, Walk Free & IOM 2022; ILO 2020). Built environment, which construction is a large part of, is classified as 'high risk' for modern slavery (World Green Building Council 2023). On top of the human rights and worker's rights issues throughout the supply chain, construction work alone poses a risk for workers. Construction work can be risky; construction sector has the most fatal accidents and the second most non-fatal accidents at work in all of European Union (EU) (Eurostat 2025). In addition to the impacts on workers, buildings and construction affect other people as well throughout construction projects. Construction itself can cause harm and disturbance, and badly designed buildings may not serve the users or in a worst-case scenario, cause negative health impacts. (Lappeenranta 2019; City of Helsinki 2018; Felgueiras et al. 2023.)

Neither the environmental nor the social impacts of the industry can be addressed without efficient governance measures. Effective and transparent governance plays a crucial role in promoting sustainable practices, accountability and ensuring the wellbeing of both people and the environment across the supply and value chain. (World Green Building Council 2023.) However, governance alone is not a simple topic, and there are risks related to that as

well. For example, construction industry is especially vulnerable to corruption and bribery despite the related legislation and people in the industry feel, that they don't have enough resources, know-how or concrete solutions to integrate sustainability into construction projects well enough. (Nyholm et al. 2025; Ministry of Justice n.d.) As world's population continues to grow, the existing building stock is estimated to double in size in the next 25 years and unless serious changes are made to how we construct buildings and how our buildings operate, the problems at hand are only going to get worse (Iyer-Raniga and Huovila 2020.)

To address these problems, this thesis aims explore what sustainability means in construction projects and how it can be approached through environmental, social and governance (ESG). ESG as a term has gained interest in recent years. The term originates from the investor world, where it has been used to assess whether an investment is sustainable or not through environmental, social and governance factors. (Kivistö 2021.) For quite some time, sustainability in the construction industry has mostly focused on the environmental aspect of sustainability, and while sustainability reporting requirements begin to concern more and more organisations operating in the industry, social and governance aspects of sustainability need to be considered more thoroughly both in the industry as well as on project level in individual construction projects. (RTS n.d.) However, simply put, ESG is one way to assess sustainability and ESG and sustainability as terms are often used interchangeably.

The aim of the thesis is to identify the key topics, metrics and frameworks related to sustainability in construction projects and develop a framework based on the identified topics, frameworks and metrics. The framework is going to be based on ESG, and it can be used to identify potential sustainability targets to be set for new construction projects considering environmental and social sustainability as well as governance issues. The building and construction sector does not yet have an ESG based general framework for identifying and setting sustainability targets for construction projects and therefore this thesis aims to develop one and create an opportunity for a further development of the topic. The framework is then used in a real-life construction project to identify relevant potential sustainability targets for an industrial construction project. The topic is approached by a literature review as well as semi-structured interviews of specialists of the field as well as the financier of the project and the building user and owner.

The thesis aims to answer the following research questions:

1. What are the relevant ESG requirements to assess sustainability of a construction project and how are they measured?
2. What are the potential ESG targets to be set for an industrial construction project?

Due to ESG not having a single definition, to help define ESG-topics, the topical ESG-standards and related sub-topics from European Sustainability Reporting Standard (ESRS) have been used to limit and simplify the definition of ESG in this thesis. The scope of the study is limited to new construction and potential sustainability targets are identified only from the perspective of the project's financier and building owner and user.

The thesis consists of a theorical and empiric part. The theory part of the thesis is divided into three chapters, first of which explains how ESG is managed in the construction industry with both national and EU legislation as well as sustainability reporting, financing and with environmental classifications. The second chapter explains how construction project is organised, how the project is implemented, who is part of the project and why ESG factors should be integrated into the decision-making processes of a construction project. The third and final chapter covers the sustainability requirements concerning construction projects through the perspective of ESG. In the empirical part of the thesis, an ESG framework is developed based on the theorical part of the thesis. The empirical part of the study is divided into two chapters, first of which is the development of the ESG framework based on the theoretical part of the thesis. The framework is tested in a case project in the second chapter. The second chapter introduces the case project and presents the results from case study. The results are discussed in chapter 7, and the conclusions and summary of the thesis are presented in chapter 8.

2 ESG steering methodologies in construction industry

This chapter reviews the most important ESG steering methodologies in the construction industry. The steering methodologies cover the most relevant legislation at both EU and national level, corporate sustainability reporting, and financing and their significance in terms of sustainability of construction projects.

2.1 Legislation and regulations

In Finland, construction is regulated by national legislation and EU legislation. EU regulations are applied as such in all member states, but directives serve as legislative guidelines that are applied to national legislation (Eurooppatiedotus 2024). Legislation sets certain requirements for sustainability of construction. Requirements set by the legislation can be considered as minimum requirements that all projects need to fulfil. Achieving the minimum requirements only doesn't, however, guarantee a significant competitive advantage. (Autelo et al. 2024.) Legislation also often is a political compromise of various parties (Finnish Parliament n.d.). Therefore, the level required by legislation isn't always enough to ensure comprehensive sustainability of construction projects (Autelo et al. 2024).

2.1.1 EU legislation

Long term target of the European Union EU is to be climate neutral by 2050. Short term target is to reduce emissions by 55 % below 1990 level by 2030. One of EU's tools for achieving the target is a so called 'Fit for 55' -package, and one very important part of this package is the Energy Performance of Buildings Directive (EPBD), which aims to make buildings in the EU more energy efficient. The directive requires new buildings to be zero-emission, including the embodied emissions of buildings. The zero-emission requirement applies to buildings owned by public bodies beginning from 2028 and all new buildings beginning from 2030. In addition to energy efficiency requirements for new buildings, EPBD also requires energy efficiency improvements for the existing building stock in the EU. National building stocks are expected to consist of zero-emission buildings beginning

from 2050, so existing buildings need to go through energy efficiency improvements in order to achieve the target. The directive also sets requirements for the quality of indoor air in both new and existing buildings. (European Council 2025; European Commission n.d.-a.)

Construction Product Regulation (CPR) was updated in 2024, and it entered into power in the beginning of January in 2025. The updated regulation aims to better consider todays environmental challenges as well as promote sustainability and transparency in the construction industry better than the old regulation. As of now, CPR requires construction products to have digital product passport, which indicates the technical and environmental information of the product in order to more easily confirm the compliance and traceability of the construction products. The regulation also further specifies the conditions for the use of CE-marking in construction products. (Zacharia 2024.) CE-marking indicates that the producer or importer assures that the products meet European health, safety and environmental protection standards (Tukes 2025). Moreover, CPR requires construction product manufacturers to report especially on CO_2 emissions and energy consumption related to primary construction products. Construction products in compliance with CPR can directly affect EU's energy efficiency and circular economy targets. Comprehensive, product level information makes sustainability assessment of buildings easier and more comprehensive while improving the sustainability of construction sector as a whole. (Zacharia 2024.)

EU's Corporate Sustainability Due Diligence Directive (CSDDD) entered into power in July 2024. Aim of the directive is to tackle the adverse human rights and environmental impacts across the value chain of companies and guide them towards more sustainable activities. However, the directive only applies to the largest companies. The directive applies to companies that operate within the EU that have over 1000 employees and a net turnover of over 450 million euros. The directive also applies to companies that operate outside of EU that have a net turnover of 450 million euros in the EU. In accordance with the directive, the subjected companies must identify and address the potential and actual adverse human rights and environmental impacts within as well as outside of Europe. CSDDD would improve especially the realisation of human and workers' rights, protection of the environment and climate as well as the companies' awareness on their human rights and environmental impacts. (Directive No 2024/1760.) There are, however, some subjected changes to the directive in the European Commission's proposed Omnibus-package. The proposal would

delay the implementation of the transposition of the directive into national law, narrow the scope of the directive's requirements, and prevent member states from imposing stricter rules on human rights or environmental violations. So far, the Omnibus-package is just a proposal from the European Commission and no final decisions on changing the directive have been made. (Accountancy Europe 2025.)

2.1.2 National legislation

The most significant piece of legislation regulating construction in Finland is the new Construction Act. At the beginning of 2025, the Land Use and construction Act that used to regulate building and construction sector was partially replaced by the Construction Act and the old law was renamed as Land Use Act. Reform of the Construction Act aims to help building and construction sector in mitigating and adapting to climate change, promoting circular economy practises and enabling nationwide digitalisation of construction decisions and data content. (Ministry of the Environment n.d.-c; Rakennustieto 2025.) The new Construction Act requires greater consideration to be given to the life cycle characteristics of buildings compared to the old act. Previously, new buildings were required to be fit for their purpose, repairable, maintainable and modifiable whereas now new buildings are required to be designed with ecological life cycle characteristics and good technical service life in mind as well. It means that in addition to repairability and maintainability, also deconstructability and reusability of building products are to be considered in building design and construction. New buildings need to be constructed with climate change mitigation in mind. (Construction Act 751/2023.)

The construction act is supplemented by a series of regulations issued under it. The new regulations concern for example climate report of building and a list of construction products, building demolition material and construction waste statement and building carbon footprint limit. Some key requirements related to the Construction Act, like low carbon requirements and carbon footprint limits, will only apply from 2026 onwards. (Rakennustieto 2025.) In addition to the Construction Act and related regulations, Finnish construction regulations contains other regulations that set more detailed rules and instructions for construction in Finland. The regulations aim for safe, healthy and accessible buildings in accordance with their intended use. Implementation of these regulations is

meant to be flexible while considering the characteristics and special features of the buildings. (Ministry of the Environment n.d.-d.) There are also various other laws and regulations regarding construction and the sustainability of construction, which are covered in the chapter on ESG requirements.

2.2 Sustainability reporting

Sustainability reporting can be either mandatory or voluntary. Mandatory reporting requirements come from the EU's Corporate Sustainability Reporting Directive (CSRD), which only applies to the largest companies (Directive No 2022/2464). There are also Voluntary Sustainability Reporting Standards for Non-Listed SMEs (VSME), which is a more streamlined reporting framework than the one used in CSRD (EFRAG 2024). Regardless of whether the reporting is voluntary or mandatory, sustainability reporting is a tool that can help companies to review the sustainability related impacts, opportunities and risks in their own operations (Directive No 2022/2464; EFRAG 2024). Sustainability reporting doesn't require companies to change their operations and to be more sustainable, but it can help them realise where additional measures are needed the most (Autelo et al. 2024).

2.2.1 Corporate Sustainability Reporting Directive

CSRD is an EU law that requires companies above a certain size to disclose information regarding the risks and opportunities related to social and environmental issues, as well as the impact of their activities on people and the environment. Companies subject to CSRD are required to report according to ESRS. (Ecobio Manager n.d.) ESRS standards consist of two cross-cutting standards, ESRS 1 and ESRS 2, and 10 topical standards. The concepts and principles to be followed in sustainability reporting are defined in ESRS 1, including the principle of double-materiality and sets the requirements for reporting sustainability information. ESRS 2, on the other hand, sets out minimum reporting requirements for companies in relation to their policies, actions, objectives and metrics, and also what they should disclose about their sustainability, business and value chain management and how sustainability is integrated into all these areas. ESRS 2 also mandates that companies

disclose their material impacts, risks and opportunities, and how these are identified and managed. The topical standards include ten topics based on ESG with five focusing on environmental issues, four on social issues and one on government issues. (Regulation No 2023/2772.)

The CSRD aims to integrate corporate sustainability reporting and financial reporting. Sustainability reporting based on CSRD helps to make the company's business activities more transparent and better sustainability reporting by companies will benefit the company itself as well as investors, ordinary citizens and various non-governmental organisations to identify companies that operate sustainably and to demand more responsible business practices for people and the environment. The common ESRS standards as a basis for sustainability reporting will help companies understand the risks associated with their sustainability activities and enable fair comparison of companies. The company's efforts to address sustainability issues and minimise the risks stemming from them can have a significant impact on the company's funding in the future. (Regulation No 2023/2772.)

Each company can define themselves which reporting topics they consider as key topics for their business activities. However, the topics included and excluded from the report must be credibly justified in the report. (Granlund Oy 2021b.) The limitations of the topics included in the sustainability reports with accordance to CSRD are made with double materiality analysis. Double materiality analysis also helps identify areas for improvement in the company's operations. In double material analysis the company's sustainability and its impacts are assessed from inside out and outside in. Company's ESG impacts are assessed from inside out, meaning how the company's operations affect the surrounding society, and the environment and the company's economic impacts are assessed from outside in, meaning how people or the society affect the company's operations. (Regulation No 2023/2772.) The company's business activities affect the surrounding society in short-, mid- and long-term, both at the beginning and end of the value chain. The effects and risks may include, for example the emissions resulting from the company's operations, human rights violations in the value chain as well as material use. The material economic impacts of the company include costs arising from emission allowances, energy prices and various insurances. A topic is material to the company when it meets one or both of the materialities. (Granlund Oy 2021b.)

Figure 1. Visualisation of double materiality (Regulation No 2023/2772, GRI n.d.).

The CSRD directive enters into power step by step and as of 2024, only large enterprises have had to report according to CSRD in 2025, but from 2025 onwards, the rules are expanded to apply to companies that have at least 50 million € turnover, 25 million € balance sheet and over 250 employees, as long as at least two of the criteria fit (KPMG 2025). All listed small and medium sized enterprises will have to start reporting according to ESRS beginning from 2026 and finally in 2028, all companies that do trade within the EU will have to start reporting according to ESRS even if the company operates outside of EU (Granlund Oy 2021b). However, in February of 2025, the European Commission adopted the first Omnibus package to simplify EU rules and boost competitiveness, which included a proposal to apply CSRD only to the largest companies with more than 1000 employees, aiming to focus sustainability reporting obligations to companies with the most significant impact on people and the environment (European Commission 2025).

2.2.2 Voluntary Sustainability Reporting Standard

Only the largest companies are subjected to the reporting requirements of CSRD and reporting according to CSRD could be an unreasonable burden for smaller companies. However, as part of a longer value chain, small and medium-sized enterprises may be required to report on their own sustainability solutions due to a larger company's sustainability reporting requirements. (Karppinen 2025.) European Financial Reporting Advisory Group (EFRAG), which also is behind the ESRS, have published Voluntary Sustainability Reporting Standards for non-listed SMEs called VSME. VSME facilitates sustainability reporting of smaller companies. VSME covers same sustainability issues as

ESRS, but the reporting framework is more simplified. As its name suggests, the standard is voluntary, but it offers smaller companies a chance to report on their sustainability solutions and to demonstrate their commitment to sustainability and ESG principles. (EFRAG 2024.)

VSME consists of two modules. The basic module covers the basic requirements of VSME reporting. Basic module is designed to suit the needs of microenterprises, and it sets the minimum requirements for other companies. A company is considered a microenterprise when it has around 10 employees, a net turnover of around 900 000 € and 450 000 € balance sheet. The basic module covers a general description of the company and its environmental practises as well as information about social and governance issues. The comprehensive module covers the same information as the basic module, but in addition, it must include more detailed information about the environmental, social and governance metrics. The company can choose whether it reports according to the basic or comprehensive module. If a metric isn't suitable for the company's operations, it doesn't need to be reported. (EFRAG 2024.)

With the help of the reporting standards, the company can release meaningful information on how it has impacted or will potentially impact people and the environment in short-, medium- and long-term and how ESG issues have impacted or will potentially impact its economic status, performance and cash flow in short-, medium- and long-term. However, the reported information must be significant, reliable, understandable and verifiable. (EFRAG 2024.)

2.3 Financing

An essential part of any construction project is financing, and the sustainability of a building can be quite important from a financial perspective. Sustainability is predicted to have an even greater impact on availability as well as the cost of financing. Sustainability also effects the value development of a building, which is why climate risks related to investments are becoming a greater interest for investors. Sustainability may not increase the value of the building, but it helps to secure the current value of the building. In addition to investors, banks often have their own targets on the proportion of the financing they grant that is allocated to sustainable projects. (Autelo et al. 2024.)

The financiers are mostly concerned about the future business conditions. Unless sustainability matters aren't high on the building owner's priority list, the risks associated with the investment increase. (Viljakainen 2025.) Currently, financiers consider the energy efficiency and energy class, carbon emissions and environmental certifications as the most important sustainability metrics, however, the assessment of building sustainability lacks a common framework that would enable comprehensive and reliable comparison of sustainability of different buildings. A common interpretation of the sufficient level of sustainability would greatly improve the assessment of building sustainability. (Autelo et al. 2024.)

Green finance may be granted for new and existing green projects like low carbon construction projects, energy efficiency improvements of existing buildings or similar projects that contribute to sustainable development. In return to the requirements, financiers often have incentives such as lower interest rates for projects that fulfil the criteria of green finance. Sometimes it can be possible to get more financing for green projects than similar non-green ones and the loan period may also be longer than usual, giving the project more time to pay for itself. (Saari et al. 2024.)

2.3.1 EU Taxonomy

The EU has a union wide criterion for environmentally sustainable business activities called EU Taxonomy. The aim of the taxonomy is to steer capital towards sustainable business and green economy. The taxonomy itself doesn't force business activity to become sustainable but rather encourages steering the activity towards sustainability through transparency and voluntary action. Taxonomy helps businesses and investors at recognising environmentally sustainable activities easier than before and the taxonomy's common criteria enables fair comparison of sustainable business activities. It also helps businesses in planning sustainable transition as well as sustainable financing and it prevents greenwashing practises. (European Commission n.d.-b.)

EU taxonomy is based on six environmental objectives (Table 1). The taxonomy criterion classifies an economic activity as environmentally sustainable if the activity significantly contributes to one or more of the environmental objectives and does no significant harm to the other five objectives. The environmental objectives include their own technical screening

criteria that the project must fulfil in order to significantly contribute towards the objective. In order to be labelled sustainable, the activity must also meet minimum social safeguards, meaning that the activity cannot for example violate human rights or be linked to bribery or corruption in any way. Each environmental objective has their own technical screening criteria to be met. (Regulation No 852/2020.) A business activity may not be classified as environmentally sustainable by the standards of the taxonomy regulation, but it doesn't necessarily mean that the business activity is harmful for the environment either. The taxonomy regulation has a strong focus on activities that have a significant contribution to the environmental objectives set in the regulation. Even if a business activity did not fit the taxonomy criteria, the activities still can contribute towards sustainability. (European Commission n.d.-b.)

Table 1. Environmental objectives of the EU Taxonomy Regulation (Regulation No 852/2020).

Climate change mitigation	Transition to a circular economy
Climate change adaptation	Pollution prevention and control
Sustainable use and protection of water and marine resources	Protection and restoration of biodiversity and ecosystems

EU Taxonomy has various impacts on construction projects. If taxonomy accordance is set as one of the project's objectives, it is crucial to include taxonomy requirements in all tendering and contract documents. At the beginning of the project, it should be determined that which technical screening criteria will be used to review the project. The fulfilment of the criteria must also be monitored throughout the project. (Hietala 2025.) For the construction of new buildings, the technical screening criteria can be either contributing to climate mitigation, contributing to climate adaptation or contributing to circular economy. (European Commission n.d.-c.) All subcontractors, service providers and construction material and product suppliers must be required to act in accordance with the taxonomy requirements. Finally, all the financial information regarding the project is gathered and reported in accordance with the taxonomy and the project can be verified as environmentally sustainable. (Hietala 2025.) Fulfilling the taxonomy criteria may also help the project in

getting green finance since many financiers may set taxonomy criteria as their requirements for green financing (Autelo et al. 2024).

2.4 Environmental classifications

Environmental classifications cover various environmental certification schemes that enable assessment, authentication, and comparison of environmental performance of buildings. Environmental certificates enable comparison between buildings as well as recognising environmentally friendly buildings. Environmental certifications ensure that sustainable development perspectives are considered throughout the project to improve building efficiency, reduce costs and resource use, and enhance the economic value and performance of the building. Certifications can be applied to either new construction projects or buildings already in use. (Green Building Council Finland n.d.)

Each environmental classification system has their own assessment criteria and certifiable buildings are given scores based on how well they fit the assessment criteria. Scoring systems vary between classification systems. Essential part of any certification system is external evaluation to ensure that the building truly fits the criteria of the certification in terms of design, construction and operation. The most used environmental certifications for buildings with relevance to industrial buildings in Finland include Building Research Establishment Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED), and Rakennustiedon ympäristöluokitus (YL-luokitus, Eng. YL-classification). (Green Building Council Finland n.d.)

Use of environmental certifications offer lots of benefits for the owner and users of the building and while the certifications are a proof of environmentally responsible actions, the certifications are only one aspect of a larger picture, and certifications alone don’t ensure sustainable construction. Certifications should be supplemented with other approaches to ensure comprehensive sustainability assessment throughout the project. (Salonen 2021.)

3 Progress and ESG decision-making in construction projects

This chapter explains the progress of a construction project, what happens in different phases of a construction project and who are a part of the project. The chapter also explains how ESG factors can be integrated to the decision-making processes in construction projects and what are the ESG-related challenges in current construction projects.

3.1 Phases of a construction project

A construction project is traditionally divided into seven phases, which are space need report, project brief, proposal planning, general planning, implementation planning, construction and warranty period. Figure 3 illustrates the timeline of a construction project, but realistically the phases cannot always be separated from each other and most of the time the project phases somewhat overlap with each other. In addition to the main project phases, there are several sets of tasks under the main phases including preparation of the planning, building permit tasks, preparation of construction and commissioning of the building. The decisions made at the end of each main project phase help create a framework for the future phases of the project. (Savolainen, Junnonen & Saari 2023; Junnonen & Kankainen 2023)

Figure 2. Construction project timeline (Adapted from RT 10-11224).

A construction project begins with a space need report which is often initiated by the building owner or user. The space need report provides a description of the types of spaces that are needed for the building and the requirements that have been set for them. The final result from this phase is an operational strategy that explains how the space need can be resolved,

and a real estate strategy that determines whether the spaces required for building operations should be owned or leased. The space need report will be used for the following project phases as a guideline for planning and further actions. (Junnonen & Kankainen 2023.)

The project planning phase clarifies the objectives defined in the space need report and sets them as building design requirements and as guiding measures for the implementation of the project. The objectives set in this phase mainly concern functionality, quality, costs, timing and maintenance. Decisions regarding the building site, implementation method, investment and budget are also made during the project planning phase. The final result of the project plan phase is a project brief of a construction project, that sets requirements for the project timeline as well as project management procedures and objectives for the project planning. (Junnonen & Kankainen 2023.)

Proposal planning isn't reliant on other project phases, and it can be done during project and implementation planning as well if necessary (Suomen Rakennusinsinöörien Liitto RIL ry & Suomen Kuntaliitto 2013). The aim of proposal planning is to create a general solution that meets the objectives set for the construction project. Planners come up with new and innovative general plans and the functionality, costs, and environmental suitability of different general plans are carefully assessed. The approved proposal plans will serve as the basis for further planning. The final result of proposal planning is the first proposal for the complete solution for the building which includes a cost assessment, general architectural solution and the building location on the site. (Junnonen & Kankainen 2023.)

Beginning from general planning, the building is often divided into two parts: fixed and variable. The fixed parts of the building include the external appearance of the building and those spaces and technical components that are expected to remain unchanged. The variable parts of the building include spaces that are flexible in their intended use throughout the building life cycle. (Suomen Rakennusinsinöörien Liitto RIL ry & Suomen Kuntaliitto 2013.) During the general planning phase, it is also ensured that the plan meets the objectives set for the design, such as the cost estimates, timeline and environmental targets. When a general plan is done, it serves as a base for building permit documents. (Savolainen, Junnonen & Saari 2023.)

In implementation planning, the general plan is further specified. The final results of the implementation planning phase are detailed plans and product specifications that are

required for the construction and procurement. In the implementation plans and documents, the quantities, project working methods and level of quality are defined with required accuracy to stay within the implementation costs. During implementation planning it is important to ensure that everything is going according to plan and that all sub-plans form a coherent and seamless big picture. (Junnonen & Kankainen 2023.)

The final stages of a construction project are the construction itself and a warranty period. Once the preparation of construction has ensured that the targets set for the construction are achievable, the schedule is realistic and the estimate of total cost is at an acceptable level, the actual construction can begin. Supervision throughout the construction is important, so that the set target can actually be achieved. The supervision and measuring during the handover of the building ensure that the building complies with the planned design and the building parts function as specified. The possibilities of implementing changes in the construction phase are quite limited. The construction phase, however, significantly contributes to the energy, water and material use as well as waste management during the construction phase. (Savolainen, Junnonen & Saari 2023.)

Once the construction is complete, it is determined whether the building is in accordance with what was agreed on the contract and whether the planned targets were achieved. If everything is okay with the building, begins a warranty period. During the warranty period, the functionality of the building is regularly inspected and any faults that may occur are corrected while also collecting user feedback on how well the building operates. (Savolainen, Junnonen & Saari 2023.) Length of the warranty period is agreed on the contract, but it is often around two years (Junnonen & Kankainen 2023).

3.2 Parties involved in a construction project

Construction projects are the result of cooperation between numerous different parties. From space need report to commissioning of the building, a construction project can’t succeed and produce a suitable end result for the user, if its value chain is broken and uncooperative. (Junnonen & Kankainen 2013.) The various parties involved in a construction project include the party undertaking the construction project, contractee, users, various planners, specialists and contractors as well as suppliers and numerous authorities (Figure 3) (RT 10-11222.) The number of different parties involved in a construction project depends on the

extent and complexity of the project as well as the ongoing project phase. However, each party plays an important role in managing the direction, quality, costs and schedule of the construction project at every stage of the project. (Junnonen & Kankainen 2023.)

Figure 3. Parties involved in a construction project (RT 10-11222).

The parties involved in the project are divided into those who emphasise utility value and those who emphasise non-utility value. The utility value of a building refers to, for example, how the building affects the wellbeing of its users or the productivity and efficiency of the user organisation. The utility value of the building is particularly important for its users, but for planners, contractors and the building owner as well. The main job of the planners is to find solutions that meet the needs of the users. Contractors, on the other hand, aim to achieve the desired outcome as efficiently as possible, and a building is neither useful nor profitable for its owner unless it meets the needs of its users. The parties that emphasize non-use value are the various authorities involved in the construction project. Their responsibility is to ensure that the use of the building is safe, and that it doesn't pose a health hazard for the users, so the utility value is a secondary concern for them. (Savolainen, Junnonen & Saari 2023.) The authorities are regulated by legislation, various regulations, plans, local regulations, guidelines, and standards (Junnonen & Kankainen 2023).

3.3 Integrating ESG factors into decision making processes

In order for ESG factors to become a part of the decision-making process in construction projects, ESG targets should be set for the project. However, the targets can't remain vague and empty, instead, the targets must be considered in construction projects right from the

very first stages. The project-level targets should be clear and measurable so that the achievement of the target is easy to monitor. Communication regarding the targets should also be clear. But targets alone are not enough. The parties involved in the project should have sufficient skills and expertise in order to achieve the set targets and integrate them into the decision-making processes. Introducing a separate sustainability consultant at the beginning of the project could help to ensure that all aspects of sustainability are considered. (Salonen et al. 2023.)

Costs are often perceived as a barrier to achieving sustainability targets, but more sustainable choices in a project are assumed more expensive and often without proper cost-analysis. There may not be sufficient information available on how the sustainability would impact the project costs. Sometimes the impact on costs may be positive, and awareness on these positive impacts can gain interest in setting sustainability targets in construction projects. (Salonen et al. 2023.) However, costs increase the later changes are made to the project (Figure 4). Therefore, due to the costs and the availability of alternative options, considering potential sustainability targets and making cost estimates for them as early as possible in the project is essential. It becomes increasingly difficult to take the targets into account at later stages of the project and at some cases, it becomes impossible. (Savolainen, Junnonen & Saari 2023.)

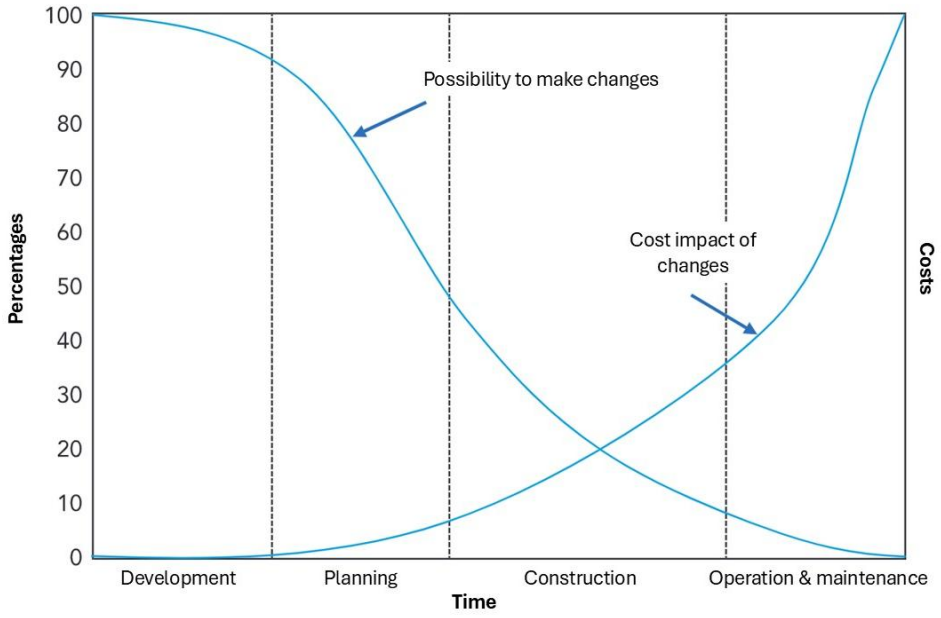

Figure 4. Connection between time and changes during a construction project (Adapted from Savolainen, Junnonen & Saari 2023).

Costs aren't the only reason why sustainability targets and related decision-making should be considered at the early stages of a project. In order to the sustainability targets to be considered as comprehensively as possible, project-level targets should be defined already at project brief phase of the project. However, target setting alone is not enough. The targets should be considered throughout the building design as well as in the equipment and product selections and make choices accordingly (Figure 5). Design and material selections can be reviewed at the earlier stages of the project in order to prepare for the effects of different choices on the building's carbon footprint and project costs. In terms of sustainability, it is also important to consider the environmental guidance at the work site as well as instructions for sustainable use of the building once its finished. (Nyholm & Wrede 2025.)

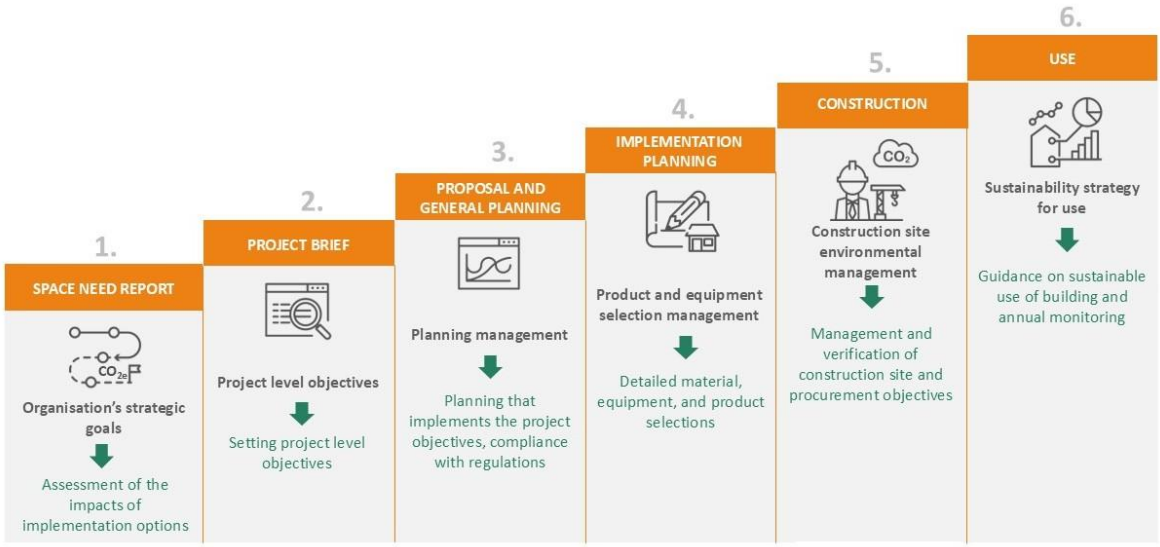

Figure 5. Guiding sustainability throughout the construction project. (Adapted from Nyholm & Wrede 2025).

4 ESG requirements in construction industry

This chapter discusses how construction projects affect the environment and society, and what kind of ESG requirements can be set for construction projects regarding environmental, social and governance issues. The chapter discusses both legislative requirements as well as potential requirements from EU Taxonomy and various voluntarily set requirements.

4.1 Environmental requirements

The environmental sustainability of a construction project can be assessed in many ways. In Finland, construction organisations often set environmental sustainability goals for the use of renewable energy and low-carbon construction. (Nyholm et al. 2025). However, buildings affect the environment many other ways as well. In addition to emissions, construction also affects biodiversity on the construction site and through the used building products in their value chain (MacNamara et al. 2023). Construction can also result in pollution through construction site waters and the use of various substances of concern and plastics (Wahlström 2021; Prasittisopin 2023). Construction also produces a vast amount of waste and buildings, and construction products use a lot of water (Nugent et al. 2022; Williams 2024). In addition to the environmental impacts of a building, the environment also affects the building and climate change is bringing new challenges with that in the future (Rakli 2023).

Table 2. ESRS Environmental standards E1–E5 and related sub-topics (Regulation No 2023/2772).

ESRS Standard	Sub-topics
E1 Climate change	Climate change adaptation, climate change mitigation, energy
E2 Pollution	Pollution of air, of water, of soil, of living organisms and food resources, substances of concern, substances of very high concern, microplastics
E3 Water and marine resources	Water, marine resources

Table 2 continues.

ESRS Standard	Sub-topics
E4 Biodiversity and ecosystems	Direct impact drivers of biodiversity loss, impacts on the state of species, on the extent and condition of ecosystems, impacts and dependencies on ecosystem services
E5 Resource use and circular economy	Resource inflows, including resource use, resource outflows related to products and services, waste

4.1.1 Climate change

From an environmental perspective, the key objective in any project is carbon footprint reduction, because in order to mitigate climate change and avoid the direst climate scenarios, GHG emissions must be significantly reduced across all sectors. (UNEP 2025.) As the buildings and construction sector is responsible for almost 40 % of global emissions, the sector has tremendous potential for climate change mitigation (Nugent et al. 2022). The single largest contributor to the total climate impact of a building is the manufacture of the building products, which accounts for almost a half of the overall climate impacts of a building. Manufacture of the building products includes acquiring the needed raw materials, transportation to manufacturing and the manufacturing itself.

After building products, the next largest climate impacts arise from the energy consumption during the building's use (Rakennusteollisuus RT ry 2025). The energy is used for heating and cooling the building as well as for electricity. Emissions from energy consumption vary heavily depending on the used energy source. In addition to the used energy source, the energy efficiency of the building and its technical systems have a significant impact on the emissions generated during the use of the building. (Huuhka & Lampinen 2021.) However, emissions from energy use are expected to decrease as the emission intensity of energy and district heat production decreases in the future due to decarbonisation of energy production. (Rakennusteollisuus RT ry 2025.) New construction is subjected to energy efficiency regulations and therefore built to be energy efficient, so plans on future emission reductions need to be focused on construction material production and raw material use as well as construction site activities and transportation (Tähkänen & Tähtinen 2022).

From a sustainability perspective, the emissions from construction are not the only issue. With climate change, Finnish winters are becoming milder and rainier than before, but outside of winter, heat waves and droughts as well as heavy rainfall and flooding are becoming more and more common. Adaptation is required from the whole construction sector due to the changing climate, because buildings cannot be built the same way or in the same places in the future as before. (Rakennusteollisuus RT ry n.d.-a) Increasing temperatures and prolonged heatwaves can cause problems in the building structures. Thermal movement of the buildings can lead to cracks, fractures, and loosening of fasteners, which increases the need for building maintenance and affects the building safety for its users. (Rakli 2023.) Heatwaves may also cause buildings and urban environments to become unbearably hot (Rakennusteollisuus RT ry n.d.-a). In contrast to the heat, heavy rainfall and increased humidity expose structures to other types of problems. Humid air increases moisture stress of the structures and excessive moisture can lead to microbial damage to structures. Microbial damage also increases the need for building maintenance, but it also may harm the health of the building users. (Rakli 2023.) Increased flood risks in flood-prone areas as well as rising sea levels, and the increased risk of coastal flooding are making it difficult to build in these areas. (Rakennusteollisuus RT ry n.d.-a)

The Construction Act requires new buildings to be constructed low carbon in accordance with their intended use and that a climate report to be produced for them, showing the building's carbon footprint and carbon footprint and handprint. Carbon footprint thresholds for new buildings enter into power in 2026. The thresholds, however, don't apply to all buildings. (Rakennustieto 2025.) Other than requirements coming from legislation, buildings may be subjected to stricter carbon footprint targets than set out in legislation and the aim may even be a carbon neutral building. For example, city of Helsinki has their own carbon footprint threshold for apartment buildings and other building types will have their own thresholds in the future and Senate Properties aims for carbon neutral construction and renovation due to their climate targets. (City of Helsinki 2025; Senate Properties 2025.) Carbon footprint of the project can also be calculated at the planning stage and set as a baseline. Then the aim can be to achieve a lower carbon footprint than the baseline with the help of different design solutions and comparison of them. (Jäätvuori et al. 2021.) In order to reduce the carbon footprint of the construction project, construction sites can also aim to bee emission-free. There already is a sustainable procurement green deal agreement for emission-free construction sites. Participants of the green deal aim to make their construction

sites fossil-free by the end of 2025 and the vehicles used to transport to and from the construction sites fossil free by the end of 2030. (Sitoumus 2050.)

In terms of energy efficiency, new buildings must meet the minimum energy efficiency requirements in order to it receive a building permit. Minimum energy efficiency requirements have been set in Ministry of the Environment Regulation on the Energy Efficiency of New Buildings (1010/2017). However, even stricter energy efficiency requirements can be set for buildings. For example, in EU Taxonomy, the substantial contribution criteria for climate mitigation requires new buildings to be 10 % more energy efficient than the minimum requirement set in the national legislation. Buildings larger than 5000 square meters need to undergo testing for airtightness and thermal integrity. (European Commission n.d.-c.) A construction project may also be subject to stricter energy efficiency requirements or target energy consumption than those set out in legislation (Nyholm & Wrede 2025). Energy-related targets can also include targets for renewable energy use or own energy production at the site. Renewable energy is nearly a zero-emission energy source and own energy can be produced with solar panels or ground source heat. (Green Building Council Finland n.d.-b).

There are no direct requirements for building climate change adaptation in legislation. However, climate risk assessments can be carried out on buildings, if necessary, along with adaptation measures to minimise or eliminate risks (Granlund Oy 2021c). In EU Taxonomy, the substantial contribution criteria for climate adaptation requires, that the building's climate risks are identified through climate risk and vulnerability assessment. EU Taxonomy sets out criteria for the implementation of adaptation measures. The adaptation measures should favour nature-based solutions for example. (European Commission n.d.-c.)

4.1.2 Pollution

One of the most relevant types of pollution in construction from an environmental perspective are the various harmful substances used in building materials. Awareness of the harmful effects of these materials has increased over the years, and the use of the most dangerous ones have gradually been phased out as people have become more aware of their health effects. (Wahlström 2021.) Asbestos is one of the most popular building materials taken out of use due to its health impacts. However, the potentially harmful substances

contained in building materials are constantly monitored. The most harmful substances are persistent substances, because their concentrations build up in the bodies of different species and the reduction of these substances impacts the environment quite slowly. The use of persistent organic pollutants (POPs) has been restricted with the POP convention. (Kauppi et al. 2019.) Identifying the use of various harmful substances is important for example in terms of circular economy, since reuse and recycling of old building materials should be increased (Wahlström 2021). However, reuse of materials containing potentially harmful substances could only increase the exposure of humans and the environment to them (Kauppi et al. 2019). Careless management of harmful substances can result in lifelong health issues for humans and cause unnecessary harmful impacts for both plants and animals (Wahlström 2021).

Another pollution-related issue regarding construction is contaminated soil on the construction site. Before the construction begins, it is important to determine the properties of the soil on the site. Properties of the soil gives important information whether there is something specific to consider and with thorough inspection, additional costs may be avoided, because sometimes the construction sites have contaminated soil that needs to be remediated before the construction activities can begin. The pollutants in the soil may impact people's health and the environment negatively. (Suomen Rakennusinsinöörien Liitto RIL ry & Suomen Kuntaliitto 2013.) The Finnish government has issued a decree regarding the assessment of soil contamination and the need for remediation. According to the decree, the contamination and the need for remediation must be assessed, if the concentration of one or more harmful substances exceeds the substance-specific threshold. Soil contamination is investigated by comprehensive sampling and standardised or equivalent research methods. (Government Decree 214/2007.)

Construction projects cause noise pollution during the construction as well. Construction noise is often long-term, as construction projects are rarely completed in a matter of days. Long-term exposure to noise has adverse effects on human health, as noise can disturb people's sleep, make them more irritable, and reduce their efficiency in day-to-day activities. (Aiyer & Wani 2021.) Noise pollution also has significant impact on construction worker. Noise-related injuries are one of the most common occupational illnesses among construction workers. Construction is actually the worst industry in Finland when it comes to noise-related injuries. However, workers have access to means of protection against noise,

such as hearing protectors and newer equipment can often be less noisy. People's attitudes towards noise protection has improved during recent years and the number of suspected cases of noise-related injures has declined over the years. (Nissinen 2020.)

Requirements regarding construction materials and construction products and their pollutants, construction noise and dust pollution are covered in the chapter regarding social requirements under affected communities and consumers and end-users as the requirements mainly concern workers and users' health and safety. Pollution to water is also covered under marine and water resources due to the topics being so closely connected.

4.1.3 Water and marine resources

Construction sites generate site water in combination with the used construction site methods, rainwater and meltwater, groundwater, and water from outside the site. If unpurified site water is let directly back to nature, it can cause significant harm to local water ecosystems. Solid matter, oil content or too high a pH value in construction site water can be destructive to aquatic ecosystems and hinder the growth of aquatic plants, significantly impairing the condition of the receiving water body. Management of construction site water is an essential part of construction site activities and there are various management methods available, including preventing and treating the formation of construction site water. The quality and quantity of construction site water must be monitored during the construction project in order to avoid harming the environment. (HSY n.d.-b.)

In addition to managing construction site water, the water consumption of the finished building can be affected during the project. Buildings have a considerably large water footprint and in addition to building energy efficiency, it would be essential to consider building water efficiency as well. As the water resources become more scarce, new buildings should be constructed to be water efficient or water neutral, especially in areas that already are or are projected to suffer from water scarcity in the future. Water efficiency can be improved by selecting water efficient plumbing fixtures when designing the building. Improving the water efficiency of a building also bring both economic and environmental benefits since less water is used and less water is needed to heat. (Williams 2024.)

Legislation doesn't explicitly mention construction site waters, but the Environmental Protection Act sets key requirements for the prevention of environmental pollution and the release of waste and other substances into the environment. According to the Environmental Protection Act (527/2014), the operator must also be aware of the environmental impacts and risks associated with its activities, how to manage then and how to reduce any harmful impacts. Water Services Act (119/2001) on the other hand regulates the drainage of stormwater and the municipal building regulations, required by the Construction Act (751/2023), and contains some information on the treatment of construction site waters. Requirements outside of legislation may include requirements from EU Taxonomy. EU Taxonomy for example requires a water management plan for construction site water in order to identify and address the risks of environmental pollution and avoid causing water stress. The aim of the water management plan is achieving a good aquatic environment and good ecological potential. (European Commission n.d.-c.)

Regarding building water efficiency, the Environmental Ministry Decree on the Essential Technical Requirements for Water Fixtures Intended for Use in Building Water Systems (497/2019) sets the requirements for the flow rates of building water fixtures. However, in construction projects, even stricter requirements can be set for the building water fixtures. For example, EU Taxonomy has its own, stricter flow rate requirements for certain water fixtures. (European Commission n.d.-c.) Water consumption also affects the building energy efficiency so potential energy efficiency targets may also lead to limiting water consumption, specifically in relation to the flow rates of water fixtures (Nieminen 2024).

4.1.4 Biodiversity and ecosystems

Alongside climate change, and partly as a result of it, one of the greatest threats facing the world is biodiversity loss (WWF n.d.). Nature depletes at an unprecedented rate and construction, especially construction materials, have an enormous impact on it. It is estimated that almost 30 % of biodiversity loss is linked either directly or indirectly to construction. Therefore, the construction industry has tremendous potential in lessening the biodiversity impacts of the sector, but it requires capability, opportunity and understanding from the construction practitioners. Most importantly, the whole sector must understand that

how, why and to what extent is the biodiversity affected by the construction materials that are used in today's buildings. (MacNamara et al. 2023.)

Biodiversity impacts from construction can be divided into two categories: impacts on the site and impacts in the value chain. Impacts on the site include, but are not excluded to, felling of the trees or impacting the habitats of protected species. However, only 1 % of all biodiversity impacts resulting from construction occur on the construction site, rest of the impacts occur in the projects value chain. The impacts in the value chain are a result of raw material acquisition, product manufacture, transportation, and energy production during the use of the building. For example, mines, felling of forest, water use in product manufacture and carbon footprint of transportation have an effect on the biodiversity impacts of a construction project. The biodiversity impacts can be quite complex, and the impacts may not show directly at the activity site (Figure 6). (Granlund Oy 2025.)

Climate change as well as land use and land use change are the main culprits for biodiversity loss in construction projects, but their share of the total impacts varies depending on the used construction materials. Most of the environmental footprint of concrete-framed buildings is due to climate change and only a tenth is due to land use, whereas land use accounts for just over half of the environmental footprint of wood-framed buildings. Similarly to climate change, the key to minimising impacts is to use less virgin materials and more recycled materials when construction is necessary. In addition to the materials used, the location where the environmental impacts occur is also vital in terms of how severe those impacts are. For example, production of water intensive materials is far more detrimental to biodiversity in areas that are facing severe water scarcity than it would be in areas that don't. (Granlund Oy 2025.)

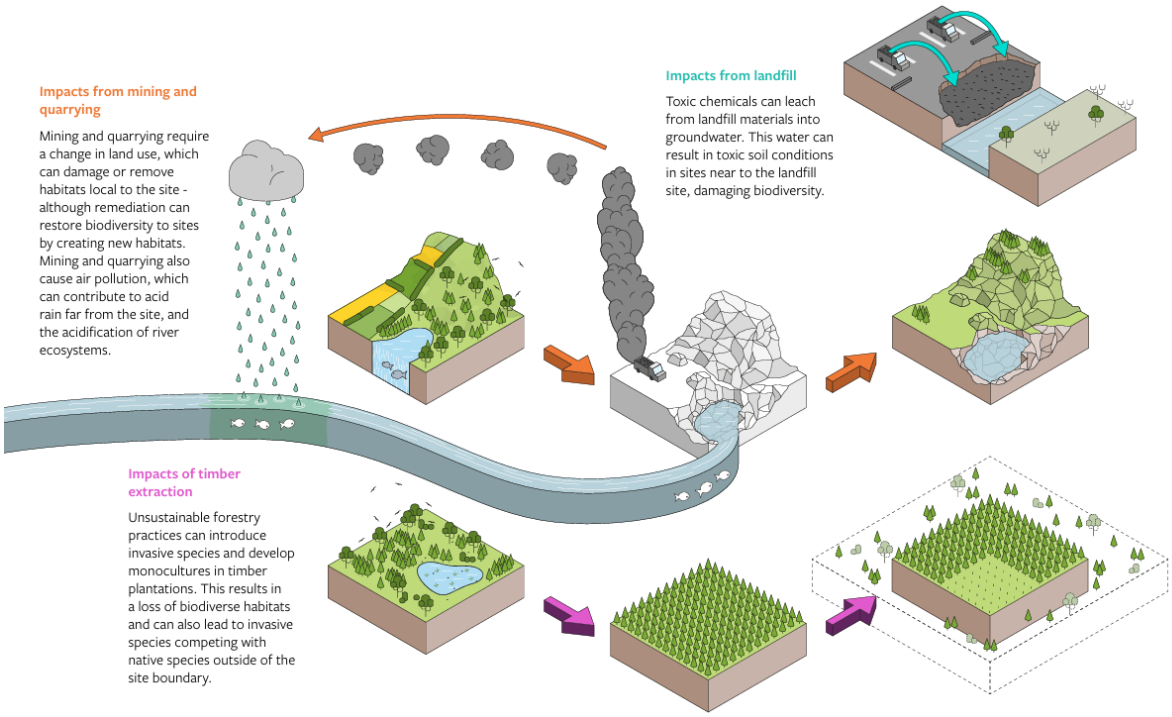

Figure 6. Biodiversity impacts can be complex and far-fetching (MacNamara et al. 2023).

Water Act (587/2011) forbids the endangering of certain small water bodies and Nature Protection Act (9/2023) forbids the destroying of rare and endangered habitats. Nature Protection Act also regulates the protection of certain areas that are important for endangered species. Therefore, no new construction should be in violation of any of these requirements. Land Use Act requires cities to draw up local master plan and general plan. There may be some restrictions for construction due to biodiversity or environmental protection requirements in local master plans or general plans, depending on the city. (Land Use Act 132/1999.)

In addition to the mandatory requirements, another biodiversity related requirement in construction project may be the calculation of nature footprint. Nature footprint measures the nature impacts for ground, water and marine ecosystems resulting from the construction project. It considers impacts from climate change, land use and land use change, water stress and pollution. Nature footprint is measured in the unit of PDF*y (potentially disappeared fraction of species over time) or biodiversity equivalents (BDe). (Granlund Oy 2025.)

Nature footprint can be offset by ecological compensation. It means that the harmful natural impacts caused by a construction project can be compensated for by restoring nature or

protecting endangered habitats elsewhere. Ecological compensation is voluntary, but the Environmental Protection Act and its implementing Compensation Regulation further specify the use of ecological compensation. (Suvantola et al. 2024.) In ecological compensation, the status of habitats and habitat types is assessed on a ten-point scale from 0 to 1, where 1 represents an area in a natural state or a state comparable to a natural state and 0 represents an area that has lost its natural state. The status of a habitat and habitat type is expressed as nature value hectares, which is calculated by multiplying the area of the site by the status of the site. (Ministry of the Environment n.d.-b.) Compensation of the harmful natural impacts caused by the construction project can be one of the requirements set for the project (Nyholm & Väliaho 2025).

Construction projects can also have a requirement for the use of a green factor. The requirement can either come from a land use plan or one of the parties involved in the construction project. The green factor expresses the amount and quality of vegetation and ecologically useful surfaces in relation to the total area of the project. Green factor is currently the most widely used metric for assessing the nature impact of construction projects. (Granlund Oy 2021a; Ilmatieteenlaitos, Suomen Ympäristökeskus & CANEMURE 2024.) Some biodiversity-related requirements regarding the construction site may come from the EU Taxonomy as well. According to the taxonomy, new buildings cannot be constructed on arable land areas, fertile farmlands, untouched land areas with high biodiversity value or an area that serves as a habitat for endangered species on the European red list. New buildings cannot also be constructed on forest land areas under certain conditions. (European Commission n.d.-c.)

4.1.5 Resource use and circular economy

Circular economy plays a significant role in reducing the climate and nature impacts of a building's life cycle. In circular economy of buildings, it’s important to focus on the entire life cycle of a building, beginning from the manufacture of building materials and products to the demolition of the building (Figure 7). The aim of circular economy is to uphold the value of products and materials and keep them in use as long as possible, minimising the number of materials ending up as waste and maximising the use of existing resources so that as few new materials as possible are needed. (European Parliament 2023). For a construction

project, this means that the need for new construction is carefully considered and the possibility whether utilising or renovating existing spaces could meet the needs of the project. New construction should always be the last option. If new construction is decided upon, the use of recycled materials should be favoured whenever possible and durable, repairable and recyclable products should be used. (Huttunen 2021.)

In addition to the climate and nature impacts, construction and demolition generate substantial amounts of waste. Annual amount of construction and demolition waste in Finland is approximately 1,6 million tonnes, but the actual amount or recycling rate is rather difficult to estimate due to incomplete statistics. Most waste is generated in renovations and demolition of entire buildings. New construction generates waste as well, but the amounts have decreased in recent decades, because unnecessary material loss during the project increases the project costs. However, the amount of demolition materials is expected to only increase as existing building stock is renovated and their energy efficiency is improved, growth centres expect densification, and buildings get demolished in areas where the population is declining. Demolition materials should be utilised more and to a higher standard of quality in new construction and renovation projects by reusing, recycling or otherwise utilising them in order to reduce the amount of waste that end up in waste disposal. It is of course important to consider the circular economy of construction already in the planning phase, not only in terms of the materials used, but also in terms of the dismantling of the building. (Hakaste 2021.)

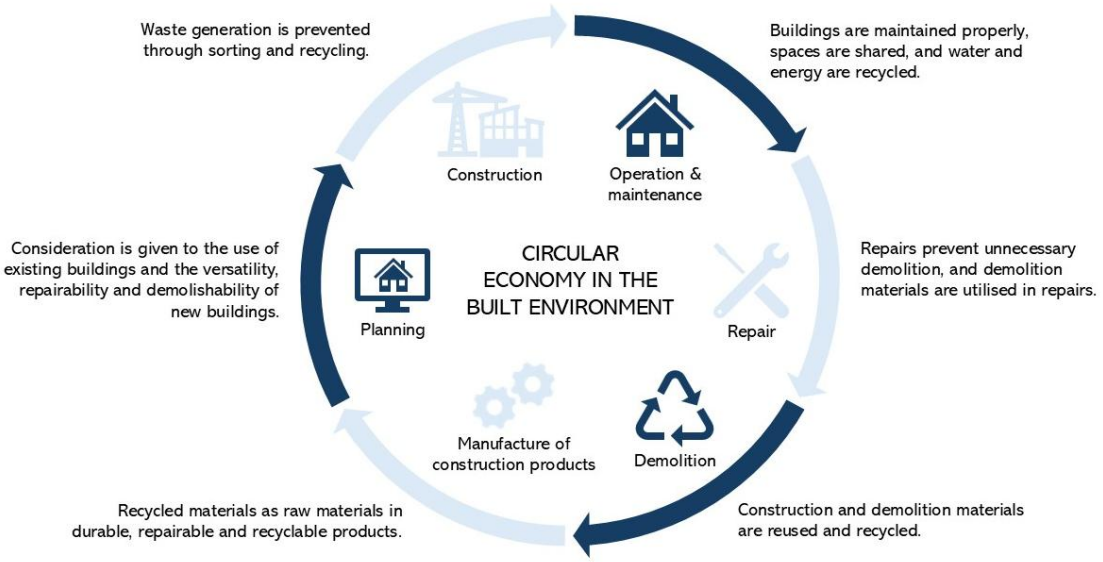

Figure 7. Promoting circular economy throughout the life cycle of a building. (Adapted from Valtioneuvosto 2021.)

EU Directive on Waste requires that by 2020 at least 70 % (by weight) of all non-hazardous construction and demolition waste should be prepared for reuse, recycling or other material recovery (Directive No 2008/98/EC). In Finland, despite the legal requirements, the recovery rate of construction and demolition waste is currently under the recommended level, around 50 to 60 %. However, legislation requires, that as much of the waste from the construction site as possible can be prepared for reuse, recycling or other material recovery. (Ministry of the Environment n.d.-a.) Moreover, the Construction Act (751/2023) requires that construction should mitigate climate change with solutions that promote circular economy The new Ministry of the Environment Decree on the Reporting of Demolition and Construction Waste (1089/2024) aims to promote the recycling and reuse of the materials and waste with the help of demolition material and construction waste reports in demolition and renovation projects. However, there are no direct requirements for example for the use of recycled materials in constructions from legislation.

Requirements related to circular economy and material use in construction projects can be for example higher than minimum material recovery rate of construction and development waste. For example, in their commitment to the Circular Economy Green Deal, Skanska has a target to achieve higher recovery rates than the minimum requirement by law is and EU Taxonomy on the other hand requires 90 % material reuse rate as a part of the circular

economy significant contribution criteria (Skanska Oy 2024; European Commission n.d.-c). Requirements can also be set for the proportion of recycled materials contained in the used building products as Fyra has set as their targets in their commitment to the Circular Economy Green Deal (Suunnittelutoimisto Fyra Oy 2024).

Regarding building design, requirements can also be a building designed for deconstruction by using design methods supporting building deconstruction at the end of its life cycle (Charlson 2013). EU Taxonomy also requires that buildings should be designed and constructed in a way that supports circular economy, for example in accordance with ISO 20887, which includes principles, requirements and guidance on building design for disassembly and adaptability. (European Commission n.d.-c.) Requirements can also include designing buildings to be versatile, adaptable and modifiable as well as expandable. Buildings that are designed flexibly will adapt to changing and varying use-needs of the user and the building serves the user better throughout its entire life cycle. Expandability, on the other hand, enables the expanding of the buildings later in order to for example expansion of operations. (Häkkinen & Ala-Kotila 2019.)

4.2 Social requirements

Built environment employs a vast number of people globally and buildings and construction affect almost everyone's everyday life one way or another. However, social responsibility often receives less attention than environmental sustainability in construction projects. Many experts feel that several metrics have existed for quite a while to assess environmental sustainability, such as carbon footprint and handprint and biodiversity footprint, but when assessing social responsibility requirements, the lack of suitable indicators poses a challenge. (CPEA 2023.) The social sustainability of companies and projects includes employees' working conditions, equal treatment and opportunities for all and other work-related rights, the communities affected and their rights and the impact on consumers and end-users and their rights. (Regulation No 2023/2772).

Table 3. ESRS social standards S1–S4 and related sub-topics (Regulation No 2023/2772).

ESRS Standard	Sub-topics
S1 Own workforce	Working conditions, equal treatment and opportunities for all, other work-related rights
S2 Workers in the value chain	Working conditions, equal treatment and opportunities for all, other work-related rights
S3 Affected communities	Communities' economic, social and cultural rights, communities' civil and political rights, rights of indigenous peoples
S4 Consumers and end-users	Information-related impacts for consumers and/or end-users, personal safety of consumers and/or end-users, social inclusion of consumers and/or end-users

4.2.1 Own workforce and workers in the value chain

Construction is a difficult field in terms of occupational safety. The work in construction is dynamic and mobile, working locations may vary and several different contractors may be working on the same site, making it more difficult to ensure occupational safety for everyone (Occupational Safety and Health Administration 2025a). Workers in the construction industry are prone to occupational accidents and in the EU, over a fifth of all fatal occupational accidents occur in the construction industry (Eurostat 2025). Climate change increases risks related to heat and varying weather condition at working sites. The workers are also exposed to various chemicals, dusts and noise at the site, which can have long-term health effects. (Rivera et al. 2024; Occupational Safety and Health Administration 2025a.) Much of the dust generated at construction sites, especially quartz dust from processing of materials such as concrete, rock, mortar and levelling compounds, increase the worker's risk for getting cancer. Dusts from wood, paints and insulation can also cause health issues, such as irritation of skin, eyes and the respiratory tract. (Tapaturva Oy & Talonrakennusteollisuus ry n.d.)

Construction industry isn't easy on migrants or women either in terms of working conditions and equality. The industry heavily relies on migrant workers, but they are more prone to exploitation by their employees because they may lack sufficient knowledge of the local language and understanding of local practices (Rivera et al. 2024). Migrant workers may be

forced to work in dangerous conditions with substandard accommodation arrangements due to not knowing their rights as workers and employer's obligations as an employer (Pixová & Rivera 2023). Women on the other hand often face sexual harassment and violations of their personal integrity by the men in the workplace. A survey for women in the construction industry revealed that over half of the women had experienced some kind of harassment at work and two thirds felt that they didn't receive any help in these situations. Harassment is downplayed by supervisors and site managers and in many cases, the harasser was the supervisor. In addition to harassment, women often are belittled, and they face critique of their work solely because of their gender. The respondents call for supervisors and site managers to take responsibility and intervene in cases of harassment as well as sanctions for the harassers. (Hellsten 2024.)

Issues related to occupational safety in Finland are regulated by Occupational Safety Act (738/2002) and Working Time Act (872/2019). Occupational Safety Act requires the employer, employee and parties involved in the workplace to ensure occupational safety. EU legislation sets the minimum requirements for occupational safety, but member countries can set even stricter national requirements. Working Hours Act, on the other hand, defines regular working hours, daily and weekly maximum working hours as well as overtime, rest time between shifts and requirement to keep records of working hours. Collective labour agreements often supplement the requirements set in Working Time Act. (Occupational Safety and Health Administration 2025b.)

Many requirements can be set regarding workers' rights and working conditions in addition to legislative requirements. For example, a zero-accident target can be set for the construction site, which requires more requires more action, systematic guidance of occupational safety throughout the project and cooperation between various parties in addition to the minimum legislative requirements. Sufficient training and orientation of employees in occupational safety matters and clear communication on safety targets and measures of the project are crucial in preventing workplace accidents. In support of the zero-accident, the construction site should have occupational safety guidelines, and all workers should have been familiarised with and committed to following the set guidelines. (Lantto & Räsänen 2019.)

Occupational safety also includes dust and noise control. A Government Decree on the Prevention of Work-Related Cancer Risks (1267/2019), which came into force in 2020,

expanded the employer's obligation to protect employees from exposure to dusts that are harmful to health. To support the requirements of the regulation, a dust control plan can be drawn up for the work site, according to which dust pollution, dust spreading from the workstation and dust spreading from surfaces is prevented, the air is cleaned, and the use of personal protective equipment required for the work is ensured. (Rakennusteollisuus RT ry n.d.-c) As well as dust control, also noise control is regulated by a government decree. Employers must draw up and implement a noise control plan if the noise exposure level at the workplace exceeds the limit specified in the decree. Noise control at the workplace means preventing both the generation and spreading of noise by reducing noise with acoustic measures and personal protective equipment and limiting employee's exposure to noise. (Työterveyslaitos n.d.-a.)

In a construction project, all parties of the project could be required to commit to ethical guidelines to prevent misconduct in the project. Ethical guidelines may cover, for example, everyone's fundamental rights, such as pay in accordance with collective labor agreements. In addition, ethical guidelines may include equal and fair treatment for everyone, non-discrimination, occupational safety, cleanliness, and circular economy, as well as addressing concerns as they arise. (Rakennusteollisuus RT ry n.d.-b.) To report misconduct, a whistleblowing channel should be available. The channel should be available for workers in the value chain as well and information about the channel and how to use it should also be available in a language that the worker's understand. (RT-103754.)

One requirement that can be included in the project document may be requiring obtaining a written permission from each employee on the site to provide and verify information on the employee's salary and working hours before the work begins. This could prevent potential underpayment of workers in the subcontracting chain. Also, the length of subcontracting chain could be limited with separate agreement in project documents. (RT-103754.) Lengthy value chains can potentially hide worker's that don't have a right to work in Finland and excessively long subcontracting chains enable employers to bypass legislative requirements and violate workers' human rights. (Finnwatch 2022).

4.2.2 Affected communities

Depending on the construction site and construction methods, construction is bound to cause noise and vibration that may cause harm to the people nearby. According to the Environmental Protection Act, temporary noise and vibration caused by construction must be reported in writing to the city's environmental protection authority. However, reporting is not required if the activity requires an environmental permit. In terms of noise, operations should aim to achieve a situation, where the noise doesn't cause significant health hazards. (Environmental Protection Act 527/2014.) In addition, based on the Construction Act (751/2023), the city may require limiting potential adverse effects that may be caused by construction in the building permit.

In addition to the Environmental Protection Act and Construction Act, city-specific environmental protection regulations may include more specific instructions regarding activities causing noise and vibration near residential and other sensitive buildings. For example, both Lappeenranta and Helsinki require, that activities causing exceptionally disturbing noise and vibration must be informed at least a week in advance to the residents around the area, care and educational institutions as well as other institutions that may be disturbed by the activity. City of Helsinki also requires negotiation with daycares, schools and religious institutions regarding sufficient noise and vibration prevention measures, since it can cause significant harm to these institutions. So even stricter and more specified requirements can be set for construction projects in terms of noise and vibration prevention if necessary, including discussions with neighbouring institutions. (Lappeenranta 2019; City of Helsinki 2018.)

Similar to construction noise, the effects of construction dust are not limited only to construction site workers. Dust pollution can also spread outside the construction area during operations or during transport causing the nearby people also to be subjected to the harmful health impacts from the dusts. The dusts are especially harmful to children and people with respiratory illnesses, but breathing in the dust particles does not advance anyone's health in particular. (HSY n.d.-a) Legislation regarding dust control at construction sites focuses mostly on protecting the construction workers, since they are the ones in close contact with the dust and dust producing activities. However, local environmental protection regulations may include more specified requirements for dust-producing activities in order to protect

both the workers and the nearby people from the harm caused by dust pollution. For example, in the environmental protection requirements of the city of Helsinki, several protection measures have been provided to prevent spreading of the dusts around the neighbourhood. (City of Helsinki 2018.)

In conclusion, requirements regarding the affected communities are limited to the people affected during the construction of the building. Construction site can be required to prevent and minimise both noise and dust pollution caused by the construction that may cause harm to the neighbouring people (Lappeenranta 2019; City of Helsinki 2018). Also, depending on the location of the construction site, requirements may include discussions with neighbouring institutions, whether some extra measures on noise control should be taken and whether some activities causing excessive noise and vibrations should be scheduled to accommodate the institutions' needs. (City of Helsinki 2018.)

4.2.3 Consumers and end-users

Sustainability of construction is also affected by the health and safety of the end users, so the conditions of the finished building are also important in terms of sustainability. Indoor climate conditions and the quality of the environment in the building significantly affect the health and wellbeing of the building's users. For example, lighting, acoustics, indoor air quality and temperature of an office space directly affect the wellbeing and efficiency of the people that work there. Poor lighting and acoustics, on the other hand, weaken the wellbeing of the workers and increases their physical stress throughout the day. (Felgueiras et al. 2023.) Exposure to poor indoor air quality alone can cause harm to health and in a worst-case scenario can lead to long-term health issues (Työterveyslaitos n.d.-b).

Building's indoor air quality is affected by the used construction materials and furnishings, cleanliness of the building, ventilation and moisture control. The Construction Act requires buildings to be constructed safe and healthy considering the building's indoor air, moisture, temperature and lighting conditions. The building must not pose a danger to health due to, for example, indoor air quality or moisture content of building parts or structures. The products used in construction should not cause emissions into indoor air during their life cycle that cannot be considered acceptable. (Construction Act 2023/751.) In addition, a separate decree sets thresholds for indoor air pollutants at workplaces which are not to be

exceeded (Ministry of Social Affairs and Health Decree on Health Conditions in Dwellings and Other Accommodation and on the Qualification Requirements for External Experts 545/2015).

Targets that are even stricter than set by legislation can be set for both building indoor air quality and emissions from construction products. Sisäilmayhdistys has defined three indoor climate classifications in their Sisäilmastoluokitus 2018 -document. Each classification has their own target values considering temperature conditions, indoor air quality as well as target values acoustic and lighting conditions. Out of the three classifications, S1 is the best and S3 is the worst, but S3 fulfils the minimum requirements set by legislation. (RT 07-11299.) Excluding residential construction, S2 classification has already increased its popularity as general target level in construction (Talotekniikka-lehti 2018). In addition to the indoor climate classes, the document has also emissions classifications for construction and interior materials. There are also three classes for the emissions classifications, M1 to M3, out of which M1 is the best and M3 the worst. The document has defined requirements for M1 and M2 classified emission tested materials at four weeks old. These materials include construction materials and unfinished furniture. M3 classified products are products that emit more than M2 classified product. If a construction product is aiming for S1 or S2 classification, use of M2 and M3 classified materials and product should be limited. (RT 07-11299.) Therefore, a construction product can aim for indoor air classification of S1 or S1 and prefer the use of M1 classified construction and interior materials.

EU Taxonomy includes requirements regarding chemicals in construction products as well. For new buildings, EU Taxonomy sets limits on how much building products and materials that are in contact with people can contain formaldehyde and carcinogenic volatile organic compounds (VOCs). EU Taxonomy also requires that certain POPs, mercury and mercury compounds, mixtures or products containing mercury, ozone depleting substances, certain harmful substances used in electrical equipment and certain substances listed in REACH-regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals) are not to be used on certain conditions. (European Commission n.d. -c.)

From the perspective of the end users of the building, there may be requirements for accessibility. Legislation sets minimum requirements for the accessibility of buildings. According to the Construction Act (751/2023), the building and its yard and recreational areas must be designed and constructed in accordance with their intended use, number of

users and number of floors considering the accessibility and usability, especially for children, the elderly, people with disabilities and people with reduced mobility or functional limitations. In addition to the Construction Act, more specific requirements for the accessibility of buildings have been laid down in the Government Decree on Accessibility in Buildings (241/2017). Outside of legislative requirements, for example Universal Design can be utilised in building design. The aim of Universal Design is to consider the needs and functionality of different users in the best way possible. Universal Design is based on 7 principles with separate guidelines for each principle. The base for Universal Design is that the environment should be designed to meet the needs all who wish to use it. (Centre for Excellence in Universal Design n.d.).

4.3 Governance requirements

Environmental sustainability cannot be achieved without social sustainability and vice versa and therefore they should be approached simultaneously. However, aiming for and achieving comprehensive sustainability is not possible without governance that actively seeks to identify sustainability-related problems and solve them using the best possible means available. Governance also determines what ESG information gets published, how reliable the published information is and how ethical the implementation of and reporting on the ESG-factors actually is. If the governance is not committed to environmental and social responsibility, it cannot be expected to take concrete action that leads to genuine change. (World Economic Forum 2022.)

Table 4. ESRS governance standard G1 and related sub-topics.

ESRS Standard	Sub-topics
G1 Business conduct	Corporate culture, protection of whistle-blowers, animal welfare, political engagement and lobbying activities, management of relationships with suppliers including payment practices, corruption and bribery

4.3.1 Business conduct

The implementation method of the project impact significantly how sustainability is managed in construction projects. The implementation method has an effect on who has the most responsibility and influence on setting sustainability targets for the project and implementation of the set targets. (Nyholm & Wrede 2025.) Preliminary sustainability targets can be identified and set already at the project brief phase, but final targets and the implementation method of the project are set and chosen at project planning phase, so very early in the project. The selection of the implementation method of the project is affected by the scope of the project, technical complexity, special conditions, schedule, risk management, information regarding users and market conditions. (Junnonen & Kankainen 2023.) One of the requirements set for the projects could therefore be selecting the implementation method that supports the set sustainability targets the best (Nyholm & Wrede 2025).

Realisation of sustainability targets in construction projects almost always require that the targets have been considered as early as possible in the project. It is crucial that the targets are recorded in all relevant project document, so all parties of the project are aware of the targets to the extent that is necessary. The project would also benefit from defining a person or a party of the project to be responsible for each target and ensure that the person or party responsible has sufficient expertise as well as resources to complete the task. All of these could be set as separate requirements for a construction project to ensure the realisation of sustainability targets. (Nyholm & Wrede 2025.)

The construction industry deals with major economic interests, tendering, urban planning, political decision-making as well as public procurement (Rakennusteollisuus RT ry n.d.-a). Due to the circumstances, the Finnish Ministry of Justice considers construction industry as high-risk for corruption Ministry of Justice n.d.) Key requirements to be set on construction projects regarding corruption and bribery prevention in construction projects are mostly related to abiding by related legislative requirements. Most significant laws regarding corruption and bribery prevention in the construction sector are the Act on Public Procurement and Concession Contracts, the Act on Contractors Obligations and Liability when Work is Contracted Out and the Competition Act. The Act on Public Procurement and Concession Contracts (1397/2016) regulates the tendering of public procurements, meaning

especially the procurements made by the state and municipal authorities. The act aims to streamline the use of public funds and secure equal opportunities for companies and other entities to offer their goods, services and construction contracts in tender competitions for public procurements. On the other hand, The Act on Contractors Obligations and Liability when Work is Contracted Out (1233/2006), requires the client to verify, that their contractual partners have fulfilled their legal obligations. The act concerns all industries, not only the construction industry. The Competition Act (948/2011) safeguards healthy and effective competition from harmful restriction on competition, such as cartels or abuse of dominant market position.

Aiming for environmental certification or green finance can also be set as a requirement for a construction project. Achieving an environmental certification includes fulfilling a certain amount of the chosen certificate's requirements, depending on the chosen certification level. The certification requirements are often related to environmental issues, but different certificates have different criteria, and the criteria can concern social and governance issues as well. (Nieminen 2021.) Requirements regarding environmental certification can therefore be selecting a suitable certification scheme and certification level for the project as well as monitoring the fulfilment of the requirements. Green finance may include some requirements for the project as well. The requirements of green finance may concern requirements from EU Taxonomy or an environmental certificate (Viljakainen 2025). Requirements related to green finance in construction projects can be clarification of financing requirements, and if it is decided that the aim is to finance the project with green finance, requirements concern following the financier's requirements and following the fulfilment of the requirements.

5 Framework for setting sustainability targets

In this chapter, a framework for identifying and setting sustainability targets for construction projects from an ESG perspective. The theory part of the thesis as well as interviewing two specialists at Granlund Oy are used as the basis for the framework.

5.1 Defining the ESG framework

As with ESG, the framework consists of three parts: environmental sustainability, social sustainability and governance and the framework is divided into tables 5, 6 and 7, respectively. The tables have been divided into four columns, first of which indicates which ESG standard is in question. The second column indicates which ESG sub-topic is in question. The third column indicates the potential metrics and frameworks that can be used to either measure or assess the sustainability of the project. The fourth, and the last, column indicates potential project-level targets that can be set for the project based on the related metrics and frameworks. The ESG sub-topics are based on the ESG-standards defined in ESRS and party modified and simplified to fit the topic and limitations of the study. The identified metrics and frameworks are based on the material compiled in this study, interviews and their interpretation.

The aim of the framework is to work as a base for identifying and setting sustainability targets for construction projects and give examples on the most common frameworks and metrics that are used in assessing the sustainability of construction projects. The aim of the framework, however, is not to present a single, absolutely correct way to assess sustainability, as the metrics depend on the targets of the project's stakeholders and same thing may be measured in different ways depending on the target. Potential project-level targets are not limited to the targets presented in the framework and potential targets can be identified outside of the examples as well. The key is to provide a systematic way to identify sub-topics related to the project and facilitate the finding of suitable metrics and frameworks.

5.2 Environmental sustainability

Table 5 presents the ESG-standards related to environmental sustainability, the related metrics and frameworks as well as examples of potential project level targets. Environmental sustainability includes the most topics, so the most potential project level targets have been identified in relation to environmental sustainability. Identified targets related to environmental sustainability include the most numerical targets compared to identified targets for social sustainability and governance. Numerical targets include for example targets related to E-value, whole life carbon, and material use and recycling rates.

Table 5. Framework for identifying and setting environmental sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Examples of project level targets
E1	Climate change adaptation	Climate risk assessment in accordance with EU Taxonomy	*Climate risk assessment is done in accordance with EU Taxonomy requirements.* *Potential significant climate risks are reduced and/or eliminated in accordance with EU Taxonomy requirements.*
	Climate change mitigation	Building whole life carbon	*Carbon footprint of the building has been calculated (tCO2e or kg CO2e/m^2/a).* *Carbon footprint is reduced compared to the baseline (%).* *Carbon footprint threshold is set for the building (kg CO2e/m^2/a).* *Carbon neutral building.* *Construction site is low-carbon or emission free.*
	Energy	E-value in accordance with EU Taxonomy	*E-value is 10 % lower than the legal requirement in accordance with EU Taxonomy requirements.*

Table 5 continues.

E1	Energy	E-value	*E-value is lower than the legal requirement (kWh/(m^2 a)).*
		Building energy consumption	*Target for building energy consumption (kWh/a).* *Target share of renewable energy in final energy consumption (%).* *Renewable energy production at the site (kWh/a).*
E3	Water	Water fixture flow rates in accordance with EU Taxonomy	*Water fixture flow rates are limited in accordance with EU Taxonomy DNSH requirements.*
		Water consumption	*Stricter water fixture flow rates than minimum legal requirements.*
		Construction site water management in accordance with EU Taxonomy.	*A water management plan has been developed for the site in accordance with the EU taxonomy DNSH requirements, and it is being followed.*
		Construction site water management	*A water management plan has been developed for the site, and it is being followed.*
E4	Biodiversity	Nature footprint	*Calculating nature footprint of the project (BDe, PDF*y).*
		Ecological compensation	*Identifying the nature values that will be impaired by the project.* *Compensation of the impaired nature values at least in full according to Nature Protection Act (9/2023).*

Table 5 continues.

E4	Biodiversity	Green efficiency	*Use of green factor in building planning and design.*
		Environmental impact assessment in accordance with EU Taxonomy	*Environmental impact assessment is done in accordance with EU Taxonomy DNSH requirements.* *Required mitigation and compensation measures for protecting the environment are implemented.*
		Construction site selection in accordance with EU Taxonomy	*Construction site is selected in accordance with EU Taxonomy DNSH requirements.*
E5	Resource use and circular economy	Building design in accordance with EU Taxonomy	*Building is designed in accordance with circular economy principles (e.g. ISO 20887) in accordance with EU Taxonomy DNSH requirements.*
		Building design	*Building is designed to be versatile.* *Building is designed to be convertible.* *Building is designed to be expandable.* *Building is designed for disassembly.*
		Material reuse and recycling rate	*Share of recycled construction materials in total construction materials (%).* *Share of reused building materials in total construction materials (%).*

Table 5 continues.

E5	Resource use and circular economy	Construction waste recovery rate in accordance with EU Taxonomy	*Construction waste recovery rate at least 90 % in accordance with EU Taxonomy requirements.* *Construction waste recovery rate at least 70 % in accordance with EU Taxonomy DNSH requirements.*
		Construction waste recovery rate	*Construction waste recovery rate higher than minimum legal requirement (>70 %).*

5.3 Social sustainability

Table 6 presents the ESG-standards related to social sustainability, the related metrics and frameworks as well as examples of potential project level targets. The targets related to social sustainability include less numerical targets and more qualitative targets. These qualitative targets are not measured by a specific number, but by assessing whether the requirements of the target are fulfilled in the project or not.

Table 6. Framework for identifying and setting social sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Examples of project level targets
S1 & S2	Own workforce & Workers in the value chain	Occupational health & safety	*Zero accidents at construction site target.* *Occupational safety guidelines have been set, and all employees have been familiarised with them.*

Table 6 continues.

S1 & S2	Own workforce & Workers in the value chain	Labour rights and working conditions	*Ethical guidelines have been set, and all stakeholders have committed to them.* *The workplace has an anonymous reporting channel for reporting misconduct.* *Agreement on verification of salary and working time data of all workers on the site.* *Agreement on limiting the length of the contract chain.*
S3	Affected communities	Community engagement and protection	*Discussions with neighbours regarding minimising harmful impacts of construction for the neighbours.* *Noise pollution prevention plan.* *Dust pollution prevention plan.*
S4	Consumers and end-users	Indoor climate quality	*Indoor climate classification S2 or better.* *Target for the use of M1-classified building products and materials.*
		Accessibility	*Building design according to Universal Design Principles.*

5.4 Governance sustainability

Table 7 presents the ESG-standard related to governance, the related metrics and frameworks as well as examples of potential project level targets. There are the fewest targets related to governance, but in terms of implementation of project sustainability, governance targets are

the most important ones. Governance targets are the most important because potential governance targets include identifying the sustainability targets for the project, recording the set targets in the project documents as well as monitoring the implementation of the targets and defining a person responsible for each target.

Table 7. Framework for identifying and setting governance sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Examples of project level targets
G1	Business conduct	Project management	*Identifying and setting the project's sustainability targets.* *Choosing project implementation method so that it supports the set targets.* *Recording set sustainability targets in project documents.* *Defining who is responsible of each target.* *Monitoring the progress of set targets.*
		Corruption and bribery prevention	*Ethical guidelines have been set, and all stakeholders have committed to them.* *The workplace has an anonymous reporting channel for reporting misconduct.* *In public procurement, the parties to the project have committed to abide by the requirements set out in the Act on Public Procurement and Concession Contracts (1397/2016).* *The client of the construction project is committed to abide by the requirements set out in the Act on the Contractor's Obligations and Liability when Work is Contracted Out (1233/2006).* *The parties to the project have committed to abide by the requirements set out in the Competition Act (948/2011).*

Table 7 continues.

G1	Business conduct	Environmental classifications	*Selecting a suitable environmental classification scheme for the project.* *Selecting a target level of selected classification scheme.* *Fulfilling the requirements of the target level classification.*
		Green finance	*Project is financed with green finance.* *Compliance with financing requirements.*

6 Testing the framework in case project

In this chapter, the framework created in previous chapter is tested in a case project. The chapter presents the case project and uses the framework to identify sustainability targets for the project by interviewing the project's financier, building owner and building user. Based on the identified targets, the targets are combined to an ESG-concept that concludes potential targets to be set for the whole project.

6.1 Case study description

The framework is tested to Danfoss Editron's new production and office building, which is being constructed in Lappeenranta, Finland. The case building is constructed to an industrial area near the Lappeenranta airport. The building consists of two parts, the production facilities and an office space. The construction site area is around three hectares, and the gross area of the building is around 8006 square meters. The construction and lease agreement for the property was signed in March, and construction began in July 2025. The project is scheduled to be completed by October 2026. The completed building will have space for approximately 300 employees. The technical details of the example project are summarized in Table 8.

Table 8. Technical characteristics of the case project.

Area of the site	3 ha
Gross area of the building	8006 m^2
Heated net area of the building	7742 m^2
E-value of the building	112 kWh/(m^2 a)
E class of the building	B (Other buildings)
Energy consumption of the building	1 029 296 kWh/a

Financier of the case building is Osuuspankki, the contractee and owner is Lappeennrannan Yritystila Oy, and the end user is Danfoss Editron. Sustainability is an important team for both Lappeenrannan Yritystila Oy and Danfoss Editron. Lappeenrannan Yritystila Oy is a

company owned by the city of Lappeenranta, so the sustainability targets of the city also guide their operations. The city of Lappeenranta highlights sustainability in the city's strategy, vision as well as values, aiming to become a carbon neutral city by 2030 while ensuring both ecological and economical sustainability as well as the wellbeing of its residents (Lappeenranta n.d-a; Lappeenranta n.d.-b). Danfoss Editron, on the other hand, is a part of the Danfoss-group. In case of Danfoss, sustainability is a key part of the company's green growth strategy, and the core of their business is to produce solutions that reduce emissions in the industries they serve. Danfoss Editron specialises in hybrid and fully electric powertrain systems for the off-highway, on-highway and marine markets. (Danfoss n.d.-a; Danfoss n.d.-b; Danfoss n.d.-c.)

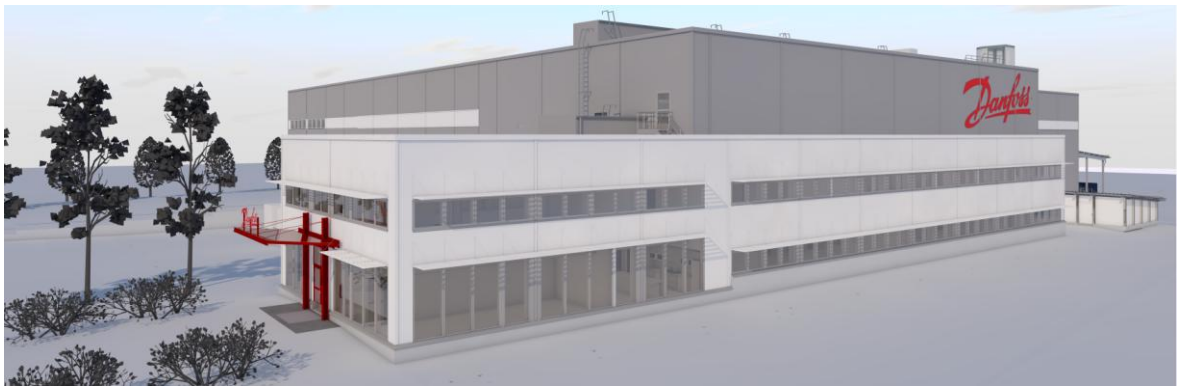

Figure 8. Picture of the case building.

In this case study, the aim is to identify the potential sustainability targets for the project from the perspective of the project financier, building owner and building user. The case study will be conducted by interviewing the financier of the project as well as the building owner and user using the framework created in this thesis as the basis for the interview and potential targets for the project. The project-level targets listed in the framework act as examples for potential targets and as a base for the discussion in the interview. However, it is possible to identify targets outside of the project-level examples listed in the framework.

6.2 Case study results

The interviews with the project financier, building owner and building user were conducted as individual interviews. The framework created in this thesis was deemed suitable tool in identifying potential sustainability targets for the project. In the interviews, the framework was gone through point by point while explaining what each framework and metric as well as the project-level targets meant and how the targets could be reflected in the project. The interviewee was able to ask for more information on the topic or state that a certain topic, framework or metric was not relevant to the project from their point of view. Only exception was the interview with the financier, in which the topics and examples of project-level targets were all considered important to some extent from the financier's point of view, but the financier sets requirements for the organisation applying for funding and not the project itself.

The resulting ESG-concept for the construction project is based on the sustainability targets identified in the interviews with the building owner and user. Building user's focus was mostly on the targets that affect the use of the building, since the building will not be owned by the user, but rented by them. The building owner, however, focused on the whole project, since the owner is both the client and the contractee of the project, meaning the owner has more responsibilities as well as obligations related to the project than the user. Due to the different focus of the owner and user, the owner identified more targets than the user. However, there were also overlaps in the targets and large proportion of them were identifies as essential to the project from both the owner's and user's perspective.

Regarding the results, it is important to note that the planning of the project has progressed at a much faster pace than is usual for similar construction projects and at the time of the interviews, the planning of the project and in later interviews even the construction of the building had already begun. Therefore, some of the identified targets are already being or potentially being implemented in the project while some targets could have been discussed more in depth at the initial stages of the project. The resulting ESG-concept can be considered a draft of ESG-targets, that could have been set for the project, if a tool like the framework created in this thesis had been available at the beginning of the project.

Background for the financier's targets is explained in chapter 6.2.1. Building owner's identified targets are gathered in Appendix 1 and building user's identified targets are

gathered in Appendix 2. For both the building user and owner, targets were identified related to all ESG areas. The targets identified in the interviews of the building owner and building user are combined into an ESG-concept in Appendix 3. The results, meaning the ESG-concept, are discussed more in depth regarding environmental targets, social targets and governance targets in chapters 6.2.2, 6.2.3 and 6.2.4, respectively.

6.2.1 Requirements from the financier

Financier of the project is Osuuspankki and an account manager of Osuuspankki was interviewed for this chapter. Osuuspankki offers green financing as one of the financing solutions for new buildings. In order for a project to receive green financing from Osuuspankki, the building must obtain or have already obtained one of the environmental certifications listen in Table 9, or the E-value of the building energy certificate must be at least 10 % lower than the threshold set in the EU's requirements for zero-energy buildings. Additionally, when the building in question has an area larger than 5000 square meters, the air tightness and heat retention of the building have to be tested, and any anomalies must be reported as well as the carbon footprint of the building must be calculated and documented to the bank if asked. The latter requirements come directly from the EU Taxonomy. However, the case project can't fulfil the EU Taxonomy's E-value requirements for new buildings, since there is no threshold set for industrial buildings. Therefore, the 10 % reduction can't be calculated for the case project. (Viljakainen 2025.)

Table 9. The certification schemes included in the financier's requirements and the required certification ratings (Viljakainen 2025).

Certification scheme	Certification rating
LEED	Gold or platinum
BREEAM	Excellent or Outstanding
Nordic Swan Ecolabel	-
EDGE	-
Rakennustiedon Ympäristöluokitus	At least three stars

It was decided not to pursue environmental certification for the project, so the project will not be financed with green funding. The financing solution that has been agreed for the project places the requirements on the organisation that applied for financing, in this case, the owner of the building, rather than on the project itself. From the financier's perspective, it is essential that the organisation's current and future cash flow indicates that repayment of the loan is possible. Poorly managed ESG-issues like potential human rights violations will harm the reputation of the organisation and poorly managed governance indicates uncertainty, which affects organisation's business and poses a risk to the organisation's solvency. However, these requirements only apply to the organisation that applied for the funding, not the project itself. (Viljakainen 2025.) Therefore, the financier doesn't have any direct sustainability requirements for the project.

6.2.2 Environmental targets

In terms of environmental targets, both the owner and the user identified calculating the building's carbon footprint, renewable energy production at the site and targets related to building design such as designing the building to be versatile, convertible and expandable as relevant targets. Carbon footprint provides valuable information regarding the building's climate impact and simply calculating it doesn't require changes to plans without separate targets for reducing the footprint or limiting it to a certain threshold. The target for renewable energy production at the site also supports the user's target for 100 % renewable energy use as well as the owner's climate and energy targets. Both the owner and the user highlighted the target to design the building to be versatile, convertible and expandable since there are already plans to expand the production facilities. Therefore, especially the production facilities are expected to be versatile and adaptable to future needs, ensuring that the building will remain useful for both the user and owner throughout its entire life cycle.

In addition to the common targets, other targets were identified as well. In addition to the energy-related common targets, the building owner raised the possibility of setting a target for energy consumption for the buildings office spaces. The target is limited to the office spaces due to the high energy consumption of the production facilities. The building user anticipates the energy consumption to only increase with expanding operations and testing the products consumes a lot of energy. Related to energy, recovery of waste heat came up in

both of the interviews, but only the owner identified it as a potential target. Recovery of waste heat was one of the identified targets that wasn't part of the example project-level targets in the framework.

Both owner and user identified water-related targets in their interviews. User identified installing water-saving water fixtures in the building as one of the targets related to water consumption and owner on the other hand identified a water consumption tracking system that collects data as their wate consumption related target. Users could be motivated to engage in water saving behaviour by publishing data related to their water consumption habits at the workplace. In addition to the water consumption, the building owner also requires that the city's urban runoff water management plan is followed at the site to control construction site waters. Climate risks were also a concern for the building owner. Identified targets related to climate risks were assessing the risks related to the building's thermal load and wind conditions as well as minimising said risks in the project.

Biodiversity was the only sub-topic under the environmental sustainability on which neither the owner nor the user felt relevant to identify any targets. However, the interviews pointed out that the building's location in a groundwater area had to be considered in its design and discussions have been held with environmental authorities regarding, for example, absorption of urban runoff waters at the site. Also, the testing facilities will have a separate drainage system so that the water used in testing of the products can be drained away without contaminating the groundwater.

6.2.3 Social targets

The least amount of targets were identified for social sustainability. Social sustainability is also the only topic where no common targets were identified. The reason for the lack common targets is mainly due to the different focus of the building owner and user. The user's targets are primarily focused on goals that affect the use of the building, so the building user only identified social targets related to consumers and end users. User's targets were related to accessibility and inclusion. In terms of accessibility, the identified target was to consider accessibility also in the production facilities. Inclusion wasn't a metric originally included in the framework, but it was added as a part of the user's targets. The user requires

that in their facilities there must be a so called ‘solitary room’, where any employee can, for example, freely practice their religion during the workday without any disturbances.

The building owner identified targets across all topics. Out of the example targets for occupational health and safety, only zero accidents at the work site -target wasn’t identified as one of the owner’s targets. However, setting occupational safety guidelines and familiarising all employees with them as well as drafting a dust control plan for the work site and making sure it is being followed were identified as relevant targets. Dust control measures at the work site include for example wetting the working surface during dust-producing work, by using appropriate personal protection equipment and other protection measures at the site to prevent the dust from spreading to clean spaces and the environment, causing harm to other people. Regarding end users, one of the building user’s identified targets was to remove all the dusts produced during construction before commissioning the building. The target is to aim a cleanliness class of P1, which means that the building is directly ready for use and free of any impurities resulting from construction.

No targets were identified regarding discussions with neighbours, but interviews pointed out that some discussions had been held with the nearby airport regarding crane use at the construction site to ensure that the construction work would not cause disturbance for the air traffic. When limiting the length of the contract chain was discussed, the owner expressed that they have not had any issues previously regarding overly lengthy contract chains and therefore didn’t feel that the target was relevant to add that to the potential targets.

6.2.4 Governance targets

Regarding governance, both the building owner and building user highlighted the targets of committing to abide by the legislation concerning corruption and bribery prevention in the construction industry. The building owner is a city-owned organisation, which makes the case-project a public procurement. Therefore, the relevant legislation concerning the case-project is the Act on Public Procurement and Concession Contracts (1397/2016), the Act on the Contractor’s Obligations and Liability when Work is Contracted Out (1233/2006) and the Competition Act. The building owner emphasised the importance of these legal requirements and that the requirements have been reviewed separately with the parties

involved in the project. The building user didn't identify any other targets related to governance.

The building owner identified all targets related to project management as relevant in their perspective. The targets identified for project management were simply to set targets for sustainability in the project and choose the project implementation method so that it supports the set targets. Other identified targets included recording the set sustainability targets in the project documents, determining who's responsible for the targets as well as monitoring the progress of the targets throughout the project. The building owner also pointed out that the requirements for environmental certification could have been explored more thoroughly and whether a certification required for the green finance would have been possible to achieve and what kind of changes that would have meant for the project. Certification was originally excluded due to the potential extra costs and neither the owner nor the user had a strong desire to pursue certification. In addition to the certification, owner also identified the utilisation of green finance for funding the project as a relevant target. Initially, the potential for green finance for the project was explored, but without strong desire to pursue environmental certification, the green finance was no longer a relevant option.

7 Discussion

Building and construction sector doesn't have an ESG-based general framework for identifying and assessing sustainability targets for construction projects. The sector has taken steps forward in recent years, but the pace of change still remains too slow in comparison to the pace that is needed. According to the professionals who responded in the sustainable construction market survey, the main challenges in achieving sustainability targets in the sector are the costs of sustainable solutions and know-how as well as lack of recourses and concrete solutions. (Nyholm et al. 2025.) The results and theory of this thesis aim to address the issues raised by the respondents, especially concerning the lack of know-how and concrete solutions. The theory and the resulting framework gather together information regarding sustainability of construction projects from several different perspectives. The thesis also concludes concrete examples of project-level targets and how the fulfilment of the targets can be measured or assessed. The resulting ESG-concept serves as a concrete example of sustainability targets set for industrial buildings.

Issues related to environmental sustainability in the building and construction sector have been on the agenda in the real estate and construction sector for a long time and one challenge has been that the focus on sustainability is mostly on environmental issues while social and governance issues get less attention. However, environmental issues have also had a limited focus on mostly climate change mitigation, emissions as well as energy efficiency while paying less attention to other important themes, such as biodiversity, circular economy, water consumption and waste. Issues related to social sustainability are gaining more and more attention and issues related to social sustainability and there is a desire to gain a much better understanding of issues related to social sustainability and how to measure and manage them. (CPEA 2023.) However, according to the sustainable construction market survey, most targets are set regarding governance and social sustainability. However, the survey doesn't specify what kind of targets are set related to the topics. Environmental sustainability targets mostly concern renewable energy, low carbon construction as well as smart energy solutions. Targets related to biodiversity and EU Taxonomy were less popular. (Nyholm et al. 2025.)

The focus on environmental targets is also reflected in the results of the thesis. The interviews also showed, that even if the potential environmental targets didn't end up as final targets, people are relatively aware of environmental targets in general. However, even in the case project, the most prominent environmental targets were those that have been on the table for some time, such as carbon footprint and energy-related targets, while no targets were set for biodiversity, for example. In the case project, the lack of targets related to biodiversity is partly due to the building's zoning area and the planned extension of the building, but one reason could also be that biodiversity-related targets, such as ecological footprint, ecological compensation or green factor haven't yet established their place as well in construction project sustainability as carbon footprint for example. However, it is believed that biodiversity will gain more importance as a sustainability trend in the construction sector in the future (Nyholm et al. 2025).

The building user's focus was mostly on targets related to the use of the building and after first contact, the user was sure that there were not going to be any sustainability targets on their behalf and that the owner would be responsible for setting all the targets. However, the user begun to identify potential targets based on the potential project-level targets of the framework quickly into the interview and in the end, also the user had identified targets across all ESG-topics. The user focused mostly on targets related to the use of the building, but several common targets with the building owner were also identified. This highlights the need to discuss potential sustainability targets for the projects as early as possible with the various parties of the project to ensure, that everyone understands what sustainability means for the project in question and how they could influence it based on their needs and ideas.

The interviews also highlight the raised obstacle of the lack of know-how and resources on the comprehensive identification and setting of sustainability targets. There is a clear will to set targets related to sustainability and at least in the case project, there is a will to do more than just fulfil mandatory requirements, but there may not be sufficient resources or know-how to do so. The ESG concept as a result from the interviews provides examples of project-level targets for industrial projects. The concept is also a draft of what could have been the actual targets for the project right from the beginning, if a similar tool had been available for use when the project started. Both the user and owner interviews revealed some valuable insights regarding the projects and potentially in their future projects, sustainability targets are more widely discussed at earlier stages. But on the other hand, many of the targets

identified in the interviews were already considered in the project, but not all targets were considered to be sustainability related, especially targets related to social sustainability and governance.

The targets identified in this thesis only reflect the thoughts of the building user and the building owner, since the financier of the project didn't have any project-level requirements. However, regarding the targets, the project parties, such as contractors, could have been consulted more extensively to discover whether they would have had targets related to their own operations that could have reflected on the project's targets. The interviews for the building owner and user were done separately, but the interview could have potentially been a joint interview between the two. In a joint interview not only both parties would have been heard, but they could also have discussed the potential targets together and deepen the understanding of why certain targets are important for the project in one's opinion. A meeting to discuss the identified targets together could have been organised. The ESG concept could have been used as a base for the meeting, the identified targets could have been discussed together and final decisions on setting the identified targets as project-level targets could have been made. The final targets should also be specified by setting a threshold for the energy consumption of the office spaces as well as specifying who is responsible for the monitoring and implementation of the set targets.

The framework functioned as a fairly flexible tool for identifying and assessing sustainability targets for the case project. Use of the framework as a basis for the interviews was a natural and easy way to approach the interviewees regarding the potential project-level targets. In addition to the ESG-topics, the framework included a wide range of sub-topics as well as examples of project-level targets. The sub-topics and example targets sparked discussion and helped understand and identify relevant targets outside of the given examples. Additional targets outside of the given examples were easy to add and the discussion supplemented the interviewees' answers and no assumptions needed to be made. In the future, the framework should be used as a base in oral discussions rather than a form to fill out, since the discussion on the topics was the main way to identifying potential targets for both the building owner and user.

8 Conclusions & Summary

This master's thesis examined what kinds of sustainability targets related to environmental sustainability, social sustainability and governance, can be set for new construction projects. The result of the thesis was an ESG framework for identifying and assessing sustainability targets for new construction projects. To ensure the functionality of the framework, it was tested in a real construction project by interviewing the financier of the project as well as the owner and user of the building by using the framework as a base for the interviews. Finally, the interviews resulted in an ESG-concept for an industrial construction project. The topic was approached through two research questions:

1. What are the relevant ESG requirements to assess sustainability of a construction project and how are they measured?
2. What are the potential ESG targets to be set for an industrial construction project?

The construction industry faces various challenges: the urgent need to reduce emissions, the biodiversity and nature impacts of construction products, occupational health and safety risks in the industry and various social and governance issues, such as harassment and inappropriate behaviour experienced by women and minorities, exploitation of foreign workforce and. corruption and bribery. There already are solutions to all these and many other issues that the industry faces, varying from building design solutions to concrete employee instructions and trainings that are already in use at workplaces. However, the main challenge is that the problems and solutions are somewhat scattered, and their comprehensive systematic review can be difficult. The ESG-framework helps combining the industry's problems and solutions under one framework and the framework can be used to identify potential targets for construction projects and how the targets can be implemented in the projects.

The literature review of the thesis answers the first research question. The literature review was divided into three parts. The first part explored the legislative requirements for construction projects as well as what significance legislation and voluntary frameworks, such as environmental classifications and sustainability reporting, have for the sustainability of construction projects. The second part explored the timeline and the various parties

involved in construction projects as well as the integration of ESG factors into the decision-making processes in the construction projects. The final part of the literary review focuses on both legislative requirements, but mostly potential voluntary sustainability requirements related to construction projects.

Construction projects are subjected to several legislative requirements on both national and EU-level. Legislative requirements consider all aspects of ESG, including environmental and nature protection, building carbon emissions, occupational health and safety, prevention discrimination and exploitation as well as corruption and bribery in the industry. Legislation sets the minimum requirements for construction project sustainability but does not necessarily encourage the pursuit of more ambitious action than the legislative minimum and the respondents in the sustainable construction market study believe that legislation could and should set more and stricter requirements for sustainability. However, more ambitious goals may be driven by the desire to maintain the value of the property by verifying the building's sustainability for example through environmental certification or EU Taxonomy compliance. As the world and the industry hurdle towards emission reductions, circular economy and social responsibility, voluntary sustainability requirements could become a significant competitive advantage for companies in the future.

The sustainability requirements can be measured with either numerical or qualitative metrics. The numerical metrics concern mostly the environmental requirements such as building carbon footprint, targets for carbon footprint reduction or building energy consumption. However, there are also qualitative metrics as well, since many of the requirements related to social sustainability and governance can't be measured with numbers. Requirements regarding fulfilling legislative requirements, setting up a whistleblowing channel or building design are not necessarily requirements that are measured with numbers but whether the requirements are fulfilled in the project or not. All requirements can't be measured with numerical metrics, but the use of qualitative metrics is essential for assessing and guiding sustainability comprehensively in construction projects.

The framework for identifying and setting sustainability targets was developed based on the literature review and a specialist interview. The framework was tested in a real construction project, and it was used as a base for interviews with the project's financier and the building's owner and user. The results from the interviews answer the second research question. Several ESG-targets related to each ESG-topic were set for the industrial case project. Most of the

set targets concerned environmental sustainability, such as calculating the building carbon footprint, renewable energy production at the site, water consumption and building design, but targets were set in relation to social sustainability and governance as well. Social sustainability targets mostly concern the workforce and the end users and targets concerning corruption and bribery prevention were highlighted by both the owner and the user. Financier's requirements concerned the organisation that applied for funding and not the project itself, so there were no requirements from the financier.

The framework provides valuable information regarding the for the buildings and construction industry on the current status of sustainability targets and a ready-made tool to facilitate the identification and setting of sustainability targets in new construction projects. The framework also has room for further development. The framework could benefit from including the legislative requirements regarding new construction as well, so that all relevant targets and requirements regarding a project were together in one place. The list of example project-level targets could also be expanded through broader specialist interviews in order to further document the information and sustainability work that is already carried out in existing construction projects. However, the framework was tested only in one project so further testing and updating the framework based on other projects could be beneficial in terms of functionality of the framework.

References

Accountancy Europe. 2025. Omnibus explained: key changes to CSDDD. Accountancy Europe. Cited 6 May 2025. Available at: https://accountancyeurope.eu/publications/omnibus-explained-key-changes-to-csddd/.

Act on Public Procurement and Concession Contracts 1397/2016. Finlex. Cited 9 Sep 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2016/1397.

Act on the Contractor's Obligations and Liability when Work is Contracted Out 1233/2006. Finlex. Cited 9 Sep 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2006/1233.

Aiyer, P. and Wani, A.M. 2021. Noise Pollution Due to Construction Activities. International Journal of Engineering Research. Available at: https://www.researchgate.net/publication/373143707_Noise_Pollution_Due_to_Construction_Activities.

Autelo, A., Kuusela, M., Sairanen, S., Karjalainen, E. and Saarinen, J. 2025. Vastuullinen Kiinteistö Markkinatutkimus. Granlund Oy & JLL. Available at: https://www.granlund.fi/uutinen/vastuullinen-kiinteisto-markkinatutkimus/.

Centre for Excellence in Universal Design. No date. Definition and Overview of Universal Design. Cited 27 Aug 2025. Available at: https://universaldesign.ie/about-universal-design/definition-and-overview.

Charlson, A. 2013. Designing for the Deconstruction Process. The Alliance for Sustainable Building Products. Cited 22 Aug 2025. Available at: https://asbp.org.uk/resource-report/designing-for-the-deconstruction-process.

City of Helsinki. 2018. Environmental protection regulations. Cited 15 Aug. 2025. Available at: https://www.hel.fi/en/urban-environment-and-traffic/protection-of-the-environment-and-nature/prevention-of-environmental-hazards/environmental-protection-regulations.

City of Helsinki. 2025. Hiilijalanjäljen raja-arvo. Helsingin kaupunki. Cited 21 Aug 2025. Available at: https://www.hel.fi/fi/kaupunkiymparisto-ja-liikenne/tontit-ja-rakentamisen-luvat/rakentamisluvan-hakeminen/hiilijalanjaljen-raja-arvo.

Competition Act 948/2011. Finlex. Cited 9 Sep 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2011/948.

Construction Act 751/2023. Finlex. Cited 6 May 2025. Available at: https://finlex.fi/fi/lainsaadanto/saadoskokoelma/2023/751.

CPEA. 2023. ESG in Construction and Real Estate Market Insights Report. Climate Positive Europe Alliance. Available at: https://blueauditor.com/esg-adoption-and-implementation-in-eu-construction-and-real-estate/.

Danfoss. No date(a). Danfoss Editron. Cited 2 Oct 2025. Available at: https://www.danfoss.com/en/about-danfoss/our-businesses/power-solutions/danfoss-editron/.

Danfoss. No date(b). Our sustainability ambitions. Cited 2 Oct 2025. Available at: https://www.danfoss.com/en/about-danfoss/company/sustainability/our-sustainability-ambitions/.

Danfoss. No date(c). Sustainability. Cited 2 Oct 2025. Available at: https://www.danfoss.com/en/about-danfoss/company/sustainability/.

Decree of the Ministry of Social Affairs and Health on Health Conditions in Dwellings and Other Accommodation and on the Qualification Requirements for External Experts 545/2015. Finlex. Cited 26 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2015/545.

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Cited 11 Jul 2025. Available at: https://eur-lex.europa.eu/eli/dir/2008/98/oj/eng.

Directive No 2022/2464. Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate

sustainability reporting. Cited Apr 29. Available: https://eur-lex.europa.eu/eli/dir/2022/2464/oj/eng

Directive No 2024/1760. Directive (EU) 2024/176 of the European Parliament and of the Council of 13 June 2024 on corporate sustainability due diligence and amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859. Cited 24 Apr 2025. Available: https://eur-lex.europa.eu/eli/dir/2024/1760/oj/eng.

Ecobio Manager. No date. ESRS-Kestävyysraportointistandardit pähkinänkuoressa. Cited 30 May 2025. Available at: https://ecobiomanager.com/fi/esrs-kestavyysraportointistandardit-pahkinankuoressa/.

EFRAG. 2024. VSME Standard. Voluntary Sustainability Reporting Standards for non-listed SMEs (VSME). European Financial Reporting Advisory Group. Available at: https://www.efrag.org/en/projects/voluntary-reporting-standard-for-smes-vsme/concluded.

Environmental Protection Act 527/2014. Finlex. Cited 8 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2014/527.

Environmental Protection Act 527/2014. Finlex. Cited 9 Sep. 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2023/9.

Eurooppatiedotus. 2024. EU-lakien suhde Suomen lakiin. Cited 25 Jul 2025. Available at: https://eurooppatiedotus.fi/suomi-ja-eu/eu-lakien-suhde-suomen-lakiin/.

European Commission. 2025. Questions and answers on simplification omnibus I and II. Cited 25 Aug. 2025. Available at: https://ec.europa.eu/commission/presscorner/detail/fi/qanda_25_615.

European Commission. No date(a). Energy Performance of Buildings Directive. Energy. Cited 12 Jun 2025. Available at: https://energy.ec.europa.eu/topics/energy-efficiency/energy-performance-buildings/energy-performance-buildings-directive_en.

European Commission. No date(b). EU Taxonomy Navigator. Cited 18 Sep 2025. Available at: https://ec.europa.eu/sustainable-finance-taxonomy/.

European Commission. No date(c). EU Taxonomy Navigator. Construction of new buildings. Cited 1 Oct 2025. Available at: https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity/350/view.

European Council. 2025. Fit for 55: making buildings in the EU greener. Cited 12 Jun 2025. Available at: https://www.consilium.europa.eu/en/infographics/fit-for-55-making-buildings-in-the-eu-greener/.

European Parliament. 2023. Circular Economy: Definition, Importance and Benefits. Cited 22 Jul 2025. Available at: https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits.

Eurostat. 2025. Accidents at work statistics. Cited 29 Jul 2025 Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Accidents_at_work_statistics.

Felgueiras, F., Mourão, Z., Moreira, A. and Gabriel, M.F. 2023. Indoor environmental quality in offices and risk of health and productivity complaints at work: a literature review. Journal of Hazardous Materials Advances, 10, pp. 100314–100314. doi: https://doi.org/10.1016/j.hazadv.2023.100314.

Finnish Parliament. No date. Näin lakeja tehdään. Cited 25 Jul 2025. Available at: https://www.eduskunta.fi/FI/NuortenEduskunta/nain_lakeja_tehdaan/Sivut/Valiokunta-valmistelee-mietinnon-.aspx.

Finnwatch. 2022. Pääurakoitsijoiden ihmisoikeusvastuu urakkaketjuissa. Cited 25 Sep 2025. Available at: https://finnwatch.org/fi/julkaisut/rakennusala.

Government Decree on Accessibility in Buildings 241/2017. Finlex. Cited 8 Sep 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2017/241.

Government Decree on the Assessment of Soil Contamination and the Need for Remediation 214/2007. Finlex. Cited: 7 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2007/214

Government Decree on the Prevention of Cancer Risks at Work 1267/2019. Finlex. Cited 7 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2019/1267.

Granlund Oy. 2021a. Biodiversiteetti. Cited 26 Aug 2025. Available at: https://www.granlund.fi/palvelut/biodiversiteetti/.

Granlund Oy. 2021b. CSRD-raportointi. Cited 30 May 2025. Available at: https://www.granlund.fi/palvelut/csrd-raportointi/.

Granlund Oy. 2021c. Ilmastoriskikartoitus. Cited 23 Aug 2025. Available at: https://www.granlund.fi/palvelut/ilmastoriskikartoitus/.

Granlund Oy. 2025. Luontojalanjälki ja rakennushankkeiden luontovaikutukset. Available at: https://www.granlund.fi/uutinen/nain-rakentaminen-vaikuttaa-luontoon/.

Green Building Council Finland. No date(a). Ympäristöluokitukset. Cited 29 Apr 2025. Available at: https://figbc.fi/ymparistoluokitukset/.

Green Building Council Finland. No date(b). Energiatehokkuus ja uusiutuva energia kiinteistö- ja rakennusalalla. Cited 19 Sep 2025. Available at: https://figbc.fi/perusoppimaara/energiatehokkuus-ja-uusiutuva-energia-kiinteisto-ja-rakennusalalla#uusiutuvan-energian-oma-tuotanto.

GRI. No date. Legislation and regulation. Double materiality. The guiding principle for sustainability reporting. Cited 2 Jun 2025. Available at: https://www.globalreporting.org/public-policy/legislation-and-regulation/.

Hakaste, H. 2021. Purkumateriaalien kiertotalouden elementit. Kiertotalous rakennetussa ympäristössä. Helsinki: Rakennustieto Oy.

Häkkinen, T. and Ala-Kotila, P. 2019. Monikäyttöisyys ja muunneltavuus kestävässä rakentamisessa. doi: https://doi.org/10.32040/2242-122x.2019.t363.

Hellsten, J. 2024. Seksuaalista häirintää ei oteta tosissaan rakennusalalla - Rakentaja-lehti. Rakentaja-lehti. Cited 26 Aug 2025. Available at: https://rakentajalehti.fi/seksuaalista-hairintaa-ei-oteta-tosissaan-rakennusalalla/.

Hietala, M. 2025. EU-taksonomian raportointiopas kiinteistö- ja rakennusalalle. [online] Rakennusteollisuuden Koulutuskeskus RATEKO. Available at: https://rateko.fi/hankkeet/taksonomian-jalkauttaminen-ja-kansallinen-tietovaranto/.

HSY. No date(a). Dust from construction sites reduces air quality. Helsinki Region Environmental Services Authority. Accessed 3 Oct 2025. Available at: https://www.hsy.fi/en/air-quality-and-climate/street-dust-reduces-air-quality/dust-from-construction-sites-reduces-air-quality/.

HSY. No date(b). Pääkaupunkiseudun työmaavesiohje. Cited 7 Aug 2025. Available at: https://julkaisu.hsy.fi/paakaupunkiseudun-tyomaavesiohje/1.html.

Huttunen, E. 2021. Kiertotalous vie kohti kestävää rakennettua ympäristöä. Kiertotalous rakennetussa ympäristössä. Helsinki: Rakennustieto Oy.

Huuhka, S. and Lampinen, E. 2021. Purkaa vai korjata - miksi korjausrakentaminen on parasta rakennusten kiertotaloutta? Kiertotalous rakennetussa ympäristössä. Helsinki: Rakennustieto Oy.

IEA. 2023. Buildings. International Energy Agency. Cited 24. Apr 2025. Available: https://www.iea.org/energy-system/buildings/.

Ilmatieteenlaitos, Suomen Ympäristökeskus and CANEMURE. 2024. Luontopohjaisten ratkaisujen suunnittelussa auttaa viherkerroin. Ilmasto-opas. Cited 9 Jun 2025. Available at: https://ilmasto-opas.fi/artikkelit/luontopohjaisten-ratkaisujen-suunnittelussa-auttaa-viherkerroin.

ILO, Walk Free and IOM. 2022. Global Estimates of Modern Slavery: Forced Labour and Forced Marriage. International Labour Organization, Walk Free and International Organization for Migration. Available: https://www.ilo.org/publications/major-publications/global-estimates-modern-slavery-forced-labour-and-forced-marriage/.

ILO. 2020. ILO Monitor: COVID-19 and the world of work. 2nd Edition. International Labour Organization. Available: https://www.ilo.org/resource/brief/ilo-monitor-covid-19-and-world-work-2nd-edition/.

Iyer-Raniga U. and Huovila, P. 2020. Global state of play for circular built environment. A report on the state of play on circularity in the built environment across Africa, Asia, Europe, Gulf Cooperation Council countries, Latin America and the Caribbean, North America and Oceania. United Nations One Planet Network Sustainable Buildings and Construction Programme. Available: https://www.oneplanetnetwork.org/knowledge-centre/resources/global-state-play-circular-built-environment/.

Jäätvuori, L., Tepponen, M., Varteva, K., Leino, R., Koskipalo, J. and Kotialho, T. 2025. Vähähiilisen rakennuttamisen klinikka - tulosraportti. Rakli. Cited 21 Aug 2025. Available at: https://www.rakli.fi/klinikat/vahahiilinen-rakennuttaminen/.

Junnonen, J-M. and Kankainen, J. 2023. Rakennuttaminen. 7th edition. Helsinki: Rakennustieto Oy.

Karppinen, R. 2025. Mikä on uusi vapaaehtoinen kestävyysraportointistandardi (VSME)? Tofuture. Cited 25 Aug 2025. Available at: https://tofuture.fi/vsme-standardi.

Kauppi, S., Bachér, J., Laitinen, S., Kiviranta, H., Suomalainen, K., Turunen, T., Kautto, P., Mannio, J., Räisänen, M., Lautala, K., Porras, S., Rantio, T., Salminen, J., Santonen, T., Seppälä, T., Teittinen, T. and Wahlström, M. 2019. Kestävä ja turvallinen kiertotalous - Selvitys POP-yhdisteiden ja SVHC-aineiden hallinnasta kiertotaloudessa. Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja. Available at: http://urn.fi/URN:ISBN:978-952-287-787-1.

Kivistö, T. 2021. ESG voi kehittää rakentamisen ketjua. Cited 2 Aug 2025. Rakennuslehti. Available at: https://www.rakennuslehti.fi/blogit/esg-voi-kehittaa-rakentamisen-ketjua/.

KPMG. 2025. CSRD-direktiivin vaikutukset kestävyysraportointiin. Cited 30 May 2025. Available at: https://kpmg.com/fi/fi/ajankohtaista/esg/csrd-direktiivin-vaikutukset-kestavyysraportointiin.html.

Land Use Act 132/1999. Finlex. Cited 28 May 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/1999/132.

Lantto, E. and Räsänen, T. 2019. TTL:n tutkimus: Rakennusalan työturvallisuuden kehitys. Rakennusteollisuus RT. Available at: https://rt.fi/jasenille/tyoturvallisuus-ja-hyvinvointi/tunne-vaarat/tapaturmatieto-riskinarvioinnin-valineena/.

Lappeenranta No date(a). Strategiset kärjet. Kestävä kaupunki. Cited 2 Oct 2025. Available at: https://www.lappeenranta.fi/fi/kaupunki-ja-paatoksenteko/strategia/strategiset-karjet/kestava-kaupunki.

Lappeenranta. 2019. Lappeenrannan kaupungin ympäristönsuojelumääräykset. Cited 18 Sep 2025. Lappeenranta. Available at: https://lappeenranta.fi/fi/ymparisto/ymparistonsuojelu/ymparistonsuojelumaaraykset.

Lappeenranta. No date(b). Visio ja arvot. Accessed 2 Oct 2025. Available at: https://www.lappeenranta.fi/fi/kaupunki-ja-paatoksenteko/strategia/visio-ja-arvot.

MacNamara, E., Macnair, L., Roberts, A., De Matei, R., Winslow, P. and Martin, B. 2023. The Embodied Biodiversity Impacts of Construction Materials. Expedition. Available at: https://expedition.uk.com/project/embodied-biodiversity-impacts-of-construction-materials/.

Ministry of Justice. No date. Anti-corruption efforts. Cited 26 Aug 2025. Available at: https://oikeusministerio.fi/en/anti-corruption-activities.

Ministry of the Environment Decree on the Energy Efficiency of New Buildings 1010/2017. Finlex. Cited 8 Aug 2025. Available: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2007/214

Ministry of the Environment Decree on the essential technical requirements for water fixtures intended for use in building water systems 497/2019. Finlex. Cited 7 Aug. 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2019/497.

Ministry of the Environment Decree on the Essential Technical Requirements for Water Fixtures Intended for Use in Building Water Systems 497/2019. Finlex. Cited 21 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2019/497.

Ministry of the Environment Decree on the Reporting of Demolition and Construction Waste 1089/2024. Finlex. Cited 7 Jul 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2024/1089.

Ministry of the Environment. No date(a). Jätelaki. Cited Aug 2025. Available at: https://ym.fi/jatteet/jatelaki.

Ministry of the Environment. No date(b). Luonnonarvojen tuottaminen. Cited 23 Aug 2025. Available at: https://ym.fi/luonnonarvojen-tuottaminen.

Ministry of the Environment. No date(c). Rakentamislaki sujuvoittaa rakentamista ja edistää päästövähennyksiä ja kiertotaloutta. Cited 6 May 2025. Available at: https://ym.fi/rakentamislaki/.

Ministry of the Environment. No date(d). Suomen rakentamismääräyskokoelma. Cited 19 Aug 2025. Ministry of the Environment. Available at: https://ym.fi/rakentamismaaraykset.

Nature Protection Act 9/2023. Finlex. Cited 28 May 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2023/9#OT6_OT0.

Nieminen, I. 2024. Kiinteistöjen käyttövesi on potentiaalinen kohde energian ja rahan säästämiseksi. LAB Focus. Cited 21 Aug 2025. Available at: https://blogit.lab.fi/labfocus/kiinteistojen-kayttovesi-potentiaalinen-kohde-energian-ja-rahan-saastamiseksi/.

Nieminen, S. 2021. Hyödyllinen vai hyödytön sertifikaatti? Hinnat ja vaatimukset. Rakentaja PRO. Cited 2 Oct 2025. Available at: https://rakentaja.pro/artikkelit/mitk%C3%A4-ovat-rakentamisen-sertifikaatit-rakennushankkeille/.

Nissinen, J. 2020. Melu ei tule tyhjästä. Rakentaja-lehti. Cited 19 Oct 2025. Available at: https://rakentajalehti.fi/melu-ei-tule-tyhjasta/.

Nugent, A., Montano-Owen, C., Pallares, L., Richardson, S. and Rowland, M. 2022. EU Policy Whole Life Carbon Roadmap for buildings. World Green Building Council. Available: https://worldgbc.org/article/eu-policy-whole-life-carbon-roadmap-for-buildings/.

Nyholm, C. and Väliaho, E. 2025. Jopa kolmannes luontokadosta johtuu rakentamisesta. Cited 23 Aug 2025. Granlund Oy. Available at: https://www.granlund.fi/blogi/jopa-kolmannes-luontokadosta-johtuu-rakentamisesta/.

Nyholm, C. and Wrede, M. 2025. Vastuullinen rakentaminen ja rakennuttaminen. Granlund Academy training, Granlund Oy, Helsinki 20 Aug. 2025.

Nyholm, C., Viitala, A., Salonen, T. and Tuominen, T.-L. 2025b. Vastuullisen rakentamisen markkinatutkimus 2025. Markkinatutkimus: rakennusalan vastuullisuus kehittyy hitaasti. Granlund Oy. Available at: https://www.granlund.fi/uutinen/vastuullinen-rakentaminen-markkinatutkimus/.

Occupational Safety and Health Act 738/2002. Finlex. Cited 9 Sep 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/saadoskaannokset/2002/eng/738.

Occupational Safety and Health Administration. 2025a. Construction industry. Cited 7 Sep 2025. Available at: https://tyosuojelu.fi/en/working-conditions/construction-industry.

Occupational Safety and Health Administration. 2025b. Working hours. Cited 7 Sep 2025 Available at: https://tyosuojelu.fi/en/employment-relationship/working-hours.

Pixová, M. and Rivera, A. 2023. Prague: a Call for Vision and Leadership. Institute for Human Rights and Business. Available at: https://www.ihrb.org/resources/pathways-for-a-just-transition-in-the-built-environment-prague.

Prasittisopin, L., Ferdous, W. and Kamchoom, V. 2023. Microplastics in construction and built environment. Developments in the Built Environment, 15, pp.100188–100188. doi: https://doi.org/10.1016/j.dibe.2023.100188.

Rakennusteollisuus RT ry. 2025. Vähähiilisen rakentamisen tietopankki. Available at: https://rateko.fi/vahahiilinen-rakentaminen/.

Rakennusteollisuus RT ry. No date(a). 5. Älä osallistu korruptioon. Cited 18 Sep 2025. Available at: https://rt.fi/meista/toimintaperiaatteemme/eettiset-periaatteet-yrityksille/5-ala-osallistu-korruptioon/.

Rakennusteollisuus RT ry. No date(a). Ilmastonmuutokseen sopeutuminen. Cited: 18 Aug 2025. Available at: https://rt.fi/tietoa-alasta/ymparisto-ja-ilmasto/vahahiilinen-rakentaminen/ilmastonmuutokseen-sopeutuminen/.

Rakennusteollisuus RT ry. No date(b). Eettiset ohjeet rakennustyöpaikoille. Accessed 29 Aug 2025. Available at: https://rt.fi/tietoa-alasta/reilu-kilpailu-ja-tyo/eettiset-ohjeet-rakennustyopaikoille/.

Rakennusteollisuus RT ry. No date(c). Pölyntorjunta. Cited 28 Sep 2025. Available at: https://rt.fi/jasenille/tyoturvallisuus-ja-hyvinvointi/hyvat-kaytannot/polyntorjunta/.

Rakennustieto. 2025. Uusi rakentamislaki 2025 – mitä kaikkea pitää huomioida? Cited 26 Jul 2025. Available at: https://www.rakennustieto.fi/rakentamislaki.

Rakli. 2023. Kiinteistökanta ja infra ilmaston äärіolosuhteissa -asiantuntijariihi. Cited 18 Aug 2025. Available at: https://www.rakli.fi/kiinteistokanta-ja-infra-ilmaston-aariolosuhteissa-asiantuntijariihi/.

Regulation No 2023/2772. Commission Delegated Regulation (EU) 2023/2772 of 31 July 2023 supplementing Directive 2013/34/EU of the European Parliament and of the Council as regards sustainability reporting standards. Cited 2 June 2025. Available at: http://data.europa.eu/eli/reg_del/2023/2772.

Regulation No 852/2020. Regulation 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088. Cited 2 Jun 2025. Available at: http://data.europa.eu/eli/reg/2020/852.

Rivera, A., Ferrini, G. and Ribera Carbó, M. 2024. Advancing Just Transitions in the Built Environment – Exploring human rights in the green transition. Institute for Human Rights and Business. Available at: https://www.ihrb.org/resources/advancing-just-transitions-in-the-built-environment-exploring-human-rights-in-the-green-transition.

RT 07-11299; Sisäilmastoluokitus 2018. Sisäympäristön tavoitearvot, suunnitteluohjeet ja tuotevaatimukset; Copyright Rakennustietosäätiö RTS 2018.

RT 10-11222; Talonrakennushankkeen kulku. Rakennushankkeen osapuolet; Copyright Rakennustietosäätiö RTS 2016.

RT 10-11224; Talonrakennushankkeen kulku. Rakennushankkeen vaiheet ja osittelu; Copyright Rakennustietosäätiö RTS 2016.

RT-103754; Työvoiman hyväksikäytön torjunta rakennusalalla; Copyright Rakennustietosäätiö RTS 2024.

RTS. 2025. KIVA – Kiinteistökohtaiset vastuullisuuskriteerit. Cited 2 Nov 2025. Rakennustietosäätiö RTS. Available at: https://www.rts.fi/project/kiva-kiinteistokohtaiset-vastuullisuuskriteerit/.

Saari, A., Sinclair, S., Ciro, T., Holopainen, M., Leshinsky, R., Junnila, S. and Salakka, A. 2024. Green Real Estate Financing Market Report 2024. Aalto University. Available at: https://www.aalto.fi/en/department-of-built-environment/2024-green-finance-report-for-sustainable-real-estate.

Salonen, T. 2021. Ympäristösertifikaatti ei ole tae vastuulliselle rakentamiselle. Granlund Oy. Cited 9 May 2025. Available at: https://www.granlund.fi/blogi/ymparistosertifikaatti-ei-ole-tae-vastuulliselle-rakentamiselle/.

Salonen, T., Rantanen, P., Viitala, A., Nyholm, C., Tuominen, T.-L. and Kouhia, M. 2023. Ympäristövastuullisuus Rakentamisessa Markkinatutkimus 2023. Granlund Oy. Accessed

20 Sep. 2025. Available at: https://www.granlund.fi/uutinen/markkinatutkimus-kiinteistosijoittajat-muita-edella-rakennushankkeiden-ymparistovastuullisuudessa/.

Savolainen, J., Junnonen, J-M. and Saari, A. 2023. Rakennushankkeen suunnittelun ohjaus. Helsinki: Rakennustieto.

Senate Properties. 2025. Towards carbon neutrality. Cited 21 Aug 2025. Available at: https://www.senaatti.fi/en/about-us/sustainability/towards-carbon-neutrality/.

Sitoumus2050. n.d. Päästötön työmaa - Sitoumus2050. Cited 19 Oct 2025. Available at: https://sitoumus2050.fi/paastotontyomaa#/.

Skanska Oy. 2024. Kiertotalouden green deal. Cited 25 Aug 2025. Available at: https://sitoumus2050.fi/kiertotalouden-green-deal-sitoumukset#/details/899601.

Suomen Rakennusinsinöörien Liitto RIL ry and Suomen Kuntaliitto. 2013. Taitava kuntarakennuttaja. Helsinki: Suomen Rakennusinsinöörien Liitto RIL.

Suunnittelutoimisto Fyra Oy. 2024. Kiertotalouden green deal. Cited 25 Aug 2025. Available at: https://sitoumus2050.fi/kiertotalouden-green-deal-sitoumukset#/details/903502.

Suvantola, L., Borgström, S. and Ojala, O. 2024. Vapaaehtoinen ekologinen kompensaatio - soveltamisopas. Ympäristöministeriö. Available at: https://ym.fi/ekologinen-kompensaatio.

Tähkänen, M. and Tähtinen, L. 2025. Hiilineutraalin rakennetun ympäristön toimintaohjelma. Green Building Council Finland. Available at: https://figbc.fi/julkaisut/hiilineutraalin-rakennetun-ymparistön-toimintaohjelma.

Talotekniikka-lehti. 2018. Sisäilmasto ja ilmanvaihto -opas on julkaistu. Accessed 2 Aug 2025. Available at: https://talotekniikka-lehti.fi/sisailmasto-opas/.

Tapaturva Oy and Talonrakennusteollisuus ry. 2024. Pölyriskinarviointi talonrakennusteollisuudessa. Cited 26 Aug 2025. Available at: https://rt.fi/jasenille/tyoturvallisuus-ja-hyvinvointi/hyvat-kaytannot/polyntorjunta/.

Tukes. 2025. CE-merkintä. Accessed 20 Sep 2025. Available at: https://tukes.fi/tuotteet-ja-palvelut/ce-merkinta#6d6fe8ca.

Työterveyslaitos. No date(a). Melu. Cited 19 Oct 2025. Available at: https://www.ttl.fi/teemat/tyoturvallisuus/altistuminen-tyoympariston-haittatekijoille/fysikaaliset-altisteet-tyopaikalla/melu.

Työterveyslaitos. No date(b). *Sisäilma, terveys ja oireilu.* Cited 19 Sep 2025. Available at: https://www.ttl.fi/teemat/tyohyvinvointi-ja-tyokyky/sisailma/sisailma-terveys-ja-oireilu.

UNEP. 2025. Global Status Report for Buildings and Construction 2024/2025: Not just another brick in the wall - The solutions exist. Scaling them will build on progress and cut emissions fast. United Nations Environment Programme. Paris. Available at: https://wedocs.unep.org/20.500.11822/47214.

Valtioneuvosto. 2021. Uusi suunta: Ehdotus kiertotalouden strategiseksi ohjelmaksi. Ympäristöministeriö ja Työ- ja elinkeinoministeriö. Valtioneuvoston julkaisuja. Available at: URN:ISBN:978-952-383-642-6.

Wahlström, M. 2021. Materiaalien puhtaus ja vaaralliset aineet. Kiertotalous rakennetussa ympäristössä. Helsinki: Rakennustieto Oy.

Water Act 587/2011. Finlex. Cited 8 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2011/587.

Water Services Act 119/2001. Finlex. Cited 8 Aug 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2001/119.

Williams, A. 2024. Construction must take water scarcity seriously. Cited 25 Jul 2025. CIOB. Available at: https://www.ciob.org/blog/construction-must-take-water-scarcity-seriously.

Working Time Act 872/2019. Finlex. Cited 9 Sep 2025. Available at: https://www.finlex.fi/fi/lainsaadanto/2019/872.

World Economic Forum. 2022. Why sustainable governance and corporate integrity are crucial for ESG. Defining the ‘G’ in ESG. Governance Factors at the Heart of Sustainable Business. Available at: https://www.weforum.org/stories/2022/07/the-g-in-esg-3-ways-to-not-miss-it/.

World Green Building Council. 2023. Social Impact across the Built Environment. Available at: https://worldgbc.org/article/social-impact-paper/.

WWF. No date. What is the sixth mass extinction and what can we do about it? [Cited 6 Jul 2025. Available at: https://www.worldwildlife.org/stories/what-is-the-sixth-mass-extinction-and-what-can-we-do-about-it.

Zacharia, M. 2024. Revised Construction Products Regulation (CPR) to include EPD data. Cited 8 Aug 2025. Available at: https://oneclicklca.com/en/resources/articles/revised-construction-products-regulation-to-include-epd-data.

Appendix 1. Building owner's ESG targets.

Table 1. Building owner's identified environmental sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
E1	Climate change adaptation	Climate risks	Climate risks related to the thermal load and wind conditions are assessed and reduced.
	Climate change mitigation	Building whole life carbon	Carbon footprint of the building is calculated.
	Energy	Building energy consumption	Target energy consumption for non-production related activities. Renewable energy is produced at the site with rooftop solar panels. Recovering and utilising the buildings waste heat.
E3	Water	Water consumption	Tracking system for water consumption.
		Construction site water management	In accordance with the city's urban runoff water management plan.
E5	Resource use and circular economy	Building design	Building is designed to be versatile. Building is designed to be convertible. Building is designed to be expandable.

Table 2. Building owner's identified social sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
S1 & S2	Own workforce & workers in the value chain	Occupational health and safety	Occupational safety guidelines have been set, and all employees have been familiarised with them. Construction site has a dust control plan, and it is being followed.
S3	Affected communities	Community engagement & protection	Construction site has a dust control plan, and it is being followed.
S4	Consumers and end-users	Indoor climate quality	Cleanliness classification of the building is P1.

Table 3. Building owner's identified governance targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
G1	Business conduct	Project management	Sustainability targets of the project are identified and set. Project implementation method is selected so that it supports the set targets. Selected sustainability targets are recorded in project documents. Defining who is responsible of each target. Progress of the set targets is monitored throughout the project.

Table 3 continues.

Standard	Sub-topic	Metrics and frameworks	Project level targets
G1		Corruption and bribery prevention	In public procurement, the parties to the project have committed to abide by the requirements set out in the Act on Public Procurement and Concession Contracts (1397/2016). The client of the construction project is committed to abide by the requirements set out in the Act on the Contractor's Obligations and Liability when Work is Contracted Out (1233/2006). The parties to the project have committed to abide by the requirements set out in the Competition Act (948/2011).
		Environmental classifications	A suitable environmental certification scheme for the project is investigated.
		Green finance	The possibility to utilise green financing in the project is investigated.

Appendix 2. Building user's ESG targets.

Table 1. Building user's identified environmental sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
E1	Climate change mitigation	Building whole life carbon	Carbon footprint of the building is calculated.
	Energy	Building energy consumption	Energy consumption of the building consists of 100 % renewable energy. Renewable energy production at the site with rooftop solar.
E3	Water	Water consumption	Water fixtures to be installed are water-saving.
E5	Resource use and circular economy	Building design	Building is designed to be versatile. Building is designed to be convertible. Building is designed to be expandable.

Table 2. Building user's identified social sustainability targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
S4	Consumers and end-users	Accessibility	Accessibility has been considered in the design of the production facilities.
		Inclusion	Building has a solitary room for any employee to practice their religion during the workday.

Table 3. Building user's identified governance targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
G1	Business conduct	Corruption and bribery prevention	In public procurement, the parties to the project have committed to abide by the requirements set out in the Act on Public Procurement and Concession Contracts (1397/2016). The client of the construction project is committed to abide by the requirements set out in the Act on the Contractor's Obligations and Liability when Work is Contracted Out (1233/2006). The parties to the project have committed to abide by the requirements set out in the Competition Act (948/2011).

Appendix 3. ESG concept for the case project.

Table 1. Identified environmental sustainability targets that can be set as project targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
E1	Climate change adaptation	Climate risks	Climate risks related to the thermal load and wind conditions are assessed and reduced.
	Climate change mitigation	Building whole life carbon	Carbon footprint of the building is calculated.
	Energy	Building energy consumption	Target energy consumption for non-production related activities. Renewable energy is produced at the site with rooftop solar panels. Recovering and utilising the buildings waste heat. Energy consumption of the building consists of 100 % renewable energy.
E3	Water	Water consumption	Tracking system for water consumption. Water fixtures to be installed are water-saving.
		Construction site water management	In accordance with the city's urban runoff water management plan.
E5	Resource use and circular economy	Building design	Building is designed to be versatile. Building is designed to be convertible. Building is designed to be expandable.

Table 2. Identified social sustainability targets that can be set as project targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
S1 & S2	Own workforce & workers in the value chain	Occupational health and safety	Occupational safety guidelines have been set, and all employees have been familiarised with them. Construction site has a dust control plan, and it is being followed.
S3	Affected communities	Community engagement & protection	Construction site has a dust control plan, and it is being followed.
S4	Consumers and end-users	Indoor climate quality	Cleanliness classification of the building is P1.
		Accessibility	Accessibility has been considered in the design of the production facilities.
		Inclusion	Building has a solitary room for any employee to practice their religion during the workday.

Table 3. Identified governance targets that can be set as project targets.

Standard	Sub-topic	Metrics and frameworks	Project level targets
G1	Business conduct	Project management	Sustainability targets of the project are identified and set. Project implementation method is selected so that it supports the set targets. Selected sustainability targets are recorded in project documents. Defining who is responsible of each target. Progress of the set targets is monitored throughout the project.

Table 3. continues.

Standard	Sub-topic	Metrics and frameworks	Project level targets
G1	Business conduct	Corruption and bribery prevention	In public procurement, the parties to the project have committed to abide by the requirements set out in the Act on Public Procurement and Concession Contracts (1397/2016). The client of the construction project is committed to abide by the requirements set out in the Act on the Contractor's Obligations and Liability when Work is Contracted Out (1233/2006). The parties to the project have committed to abide by the requirements set out in the Competition Act (948/2011).
		Environmental classifications	A suitable environmental certification scheme for the project is investigated.
		Green finance	The possibility to utilise green financing in the project is investigated.

Appendix 4. List of interviews of the study.

Table 1. List of interviews of the study.

Name	Title	Content	Interview date
Niina Viljakainen	Account Manager, Osuuspankki	Financier's sustainability requirements.	13.8.2025
Charlotte Nyholm; Mikaela Wrede	Team leader, sustainable construction; Construction manager, Granlund Oy	Discussion on identified project level targets in the framework.	22.9.2025
Lassi Nurmi	Real estate manager, Lappeenrannan Yritystila Oy	Owner's sustainability requirements.	1.10.2025
Ville Saarinen	Project manager, Danfoss Editron	User's sustainability requirements.	3.10.2025