CHALMERS
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# The Power of Procurement:
# How Requirements of Reuse can Accelerate Circular Construction in Sweden

Master's thesis in Design and Construction Project Management

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# Abstract

The construction sector is responsible for over one-third of the world's total greenhouse gas emissions, and a significant part of these emissions come from building materials. To reduce these emissions, the construction sector needs to move towards a circular material flow where reuse of building materials is prioritised. Procurement plays an important role in a project's structure and focus areas, and can be used as a tool to increase the use of reuse. The aim of this study was to investigate how reuse requirements in public and private procurement can promote the use of reused materials and products, and to identify barriers and opportunities for the application of reuse requirements. Through a literature study and interviews with actors in the construction sector, the knowledge and experience on the subject have been compared and analysed. The study shows that there is a significant lack of knowledge about how reuse requirements can be formulated and used in practice. There are several barriers to the implementation of reuse, such as guarantee issues, laws and regulations, and an uncertain reuse market. To increase the implementation of reuse, actors need to have the courage to set up reuse requirements, share their experiences with others and develop new working methods that promote reuse. In addition, governing institutions need to publish clear guidelines on how reuse can be implemented, provide examples of formulations that can be used in procurement and contribute with financial support to increase knowledge so that more reuse projects can be implemented. As a step towards development, the authors have, after requests from actors in the construction industry, compiled a compendium with examples of requirements linked to reuse, which can be used as inspiration for future procurements.

Keywords: reuse, procurement, requirements, construction sector, circular building, circular procurement, material flow.

Upphandlingens betydelse: Hur krav på återbruk kan påskynda cirkulärt byggande i Sverige

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# Sammanfattning

Byggbranschen står för över en tredjedel av jordens totala utsläpp av växthusgaser, och en betydande del av dessa utsläpp kommer från byggnadsmaterial. För att minska dessa utsläpp behöver byggbranschen övergå till ett cirkulärt materialflöde där återbruk av byggnadsmaterial prioriteras och implimenteras i projekt. Upphandlingen spelar en viktig roll för projektens utformning och fokusområden, och kan användas som ett verktyg för att öka användningen av återbruk. Syftet med denna studie var att undersöka hur krav på återbruk i upphandlingen kan främja användningen av återbrukade material och produkter, samt att identifiera hinder och möjligheter för tillämpningen av krav på återbruk. Genom en litteraturstudie och intervjuer med olika aktörer inom byggbranschen har kunskap och erfarenhet i ämnet jämförts och analyserats. Studien visar att det finns en betydande brist på kunskap om hur krav på återbruk kan formuleras och användas i praktiken. Det finns flera hinder för implementeringen av återbruk, som garantifrågor, lagar och regler samt en osäker återbruksmarknad. För att öka användningen av återbruk behöver aktörer våga ställa krav på återbruk, dela sina erfarenheter med andra och utveckla nya arbetsmetoder som främjar återbruk. Dessutom behöver styrande myndigheter publicera tydliga riktlinjer för hur återbruk kan implementeras, ge exempel på formuleringar som kan användas vid upphandling och bidra med ekonomiska resurser för att öka kunskapen så att fler återbruksprojekt genomförs. Som ett steg i utvecklingen har författarna sammanställt ett kompendium med exempel på kravställningar kopplade till återbruk, som kan användas som inspiration vid framtida upphandlingar, efter önskemål från aktörer inom byggbranschen.

Nyckelord: återbruk, upphandling, kravställningar, byggsektorn, cirkulärt byggande, cirkulär upphandling, materialflöde, återanvändning.

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Lastly, we want to express our gratitude towards the respondents who participated in our interview study and shared their experiences on the topic, as well as those who contributed to our summary of formulated requirements. We hope that your sharings will help the construction sector to move towards circularity.

Alicia Halling and Frida Johansson, Gothenburg, June 2023

# Glossary of Terms

| | |
|---|---|
| **Circular award criterias** | Cirkulära tilldelningskriterium |
| **Client** | Beställare |
| **Construction contract** | Utförandeentreprenad |
| **Construction document** | Bygghandling |
| **Contractor** | Entreprenör |
| **Demolition** | Demontering/Rivning |
| **Design and Build contract** | Totalentreprenad |
| **Framework agreement** | Ramavtal |
| **Functional responsibility** | Funktionsansvar |
| **Limits for total climate impact** | Gränsvärde för total klimatpåverkan |
| **Material mark-up** | Materialpåslag |
| **Partnering** | Samverkansentreprenad |
| **Procurement** | Upphandling |
| **Procurer** | Upphandlare |
| **Reuse** | Återbruk |

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# 1

# Introduction

This chapter provides a brief explanation of the importance of the reuse of construction materials and products. Additionally, the central role of procurement in promoting circularity in the construction sector will be highlighted.

## 1.1 Background

The construction sector's production levels are higher than ever, which affects the earth's environment negatively in many ways. Since buildings are responsible for more than a third of the earth's global greenhouse gas emissions, the amount of harmful emissions that are manually released is large (Nußholz et al., 2019). The majority of the emissions come from embodied impacts in building materials and products. Both the European Union (EU) (European Parliament, 2017) and the Swedish National Board of Housing, Building, and Planning (Boverket) are promoting production with lower-impact building materials and urging more reuse and recycling of materials and products to lower the emissions (Boverket, 2022). By the year 2030, the EU aims for 70 percent of all waste to be reused, recycled, or managed in another way (European Parliament, 2017). Today, this number is 44 percent so a big change needs to be made. The Swedish government has set a goal that by the year 2025 shall at least 70 percent of non-hazardous construction and demolition waste (excluding soil and stone) be prepared for reuse or recycling, or managed in another way that is not energy recycling. The Swedish Government has also an action plan for the country's waste, based on conditions that the Swedish Environmental Protection Agency (Naturvårdsverket) has investigated. To implement the goals included in the action plan, a national waste plan has been compiled which describes how the waste in Sweden can be reduced and how waste management can become more efficient. It gives an overview of the goals, means of control, and measures that have been implemented to reduce and prevent waste (Naturvårdsverket, 2020).

To map how waste should be treated and prioritised, the EU has defined a waste policy with a framework called "the waste hierarchy" with five steps in falling order: *prevention*, *preparing for re-use*, *recycling*, *recover* and *disposal*, see figure 1.1. These steps underlay how waste management should be treated in the EU and the aim of it is to show that materials can and should be managed in different ways before they go to disposal (European Commission, n.d.). In this report, the step of reuse will

be in focus.


**Figure 1.1:** The EU waste hierarchy, adapted from European Commission (n.d.)
.

One factor to implement more reuse in the construction sector is by putting requirements and regulations in the contracts and in the procurement of a project (Upphandlingsmyndigheten, n.d.-b). Since procurement forms the basis of how a project work, procurement has a great impact on how it is conducted and what it will result in. This also implies that procurement can influence how environmental questions are handled and, for example, how reuse can become a more prominent role in projects. With that as a background, this master thesis will focus on how requirements for reuse in procurement can drive the development of reuse forward and what the sector's attitude and experience with it is.

### 1.1.1 Definition of Reuse

In this report, the definition of reuse refers to materials or products that are dissembled and later reassembled, most often in another place. In other words, using the same material more than once for the same or different function. The product can undergo renovation if needed or be reassembled in its original condition. The reuse can be internally within the project or at another project. If the product is not touched and is remaining in its original position, then it is not seen as reuse but rather as waste prevention (J. Andersson et al., 2021). By not processing the material when reusing it, excess energy use required for extensive recycling processes is avoided. Therefore, reuse is the most suitable option for waste minimisation (Boverket, 2022).

### 1.1.2 Barriers and Possibilities to Reuse

Much has been written about the importance of reuse and how waste should be minimised, as well as how it can be implemented more in the construction sector.

In relation to this, the development of how to increase the reuse of building materials has been very slow. According to Gerhardsson et al. (2020) the application of circular principles in the construction sector can provide opportunities to reduce the sector's financial cost, extraction of virgin material resources, emission of greenhouse gas, and generation of waste. A study made by the Swedish Environmental Research Institute (Svenska Miljöinstitutet, IVL) shows that by reusing four common interior construction products, namely ceiling absorbers, textile tiles, interior doors and glass partitions, in a renovation project, a reduction of 21 000 tons of CO2 equivalents per year of greenhouse gas emission can be saved as well as waste generation by 18 000 tons/year and procurement cost of almost 60 million Euro/year (J. Andersson et al., 2018).

Despite the large savings that are proved to be generated from reuse and circularity in the construction sector, the application is currently limited due to several barriers. Multiple reports from sources both from Sweden and internationally made in a variety of academic levels show similar results (J. Andersson et al., 2021)(Amrén, 2022)(A. Andersson & Söderberg, 2022). In general, six barriers to the implementation of reuse in the Swedish construction sector can be identified: *habits and attitudes*, *time and resources*, *market conditions*, *knowledge and experience*, as well as *quality and guarantees*. Studies show that procurement and requirements of reuse in projects have a great impact on all of these barriers and a well-functioning procuring can be crucial for a positive reuse development (Göteborgs Stad, 2020b; Qazi & Appolloni, 2022; Colligio, 2019).

### 1.1.3 Baseline Analysis

As previously mentioned, reuse in the construction sector is a current topic and studies show that many actors are curious and interested to drive the development forward by using more reused materials and products in their organisations (Gerhardsson et al., 2020). Generally, there are few strict requirements for reuse, recycling, and other circular conditions, which in part is due to uncertainty and confusion regarding how clients, designers, and contractors can implement circularity in their organisational work. Both lack of knowledge, inadequate conditions, and traditional ways of thinking are barriers to the development of reuse. A recurring concern in client organisations is that too strict or new types of procurement requirements may lead to more expensive projects, something that is hindering the construction sector's development in requiring reuse in procurement (Göteborgs Stad, 2020a). Göteborgs Stad (2020a) has analysed several actors and found that the actors' organisational guidelines contain few clear directives for increased circularity and material management. However, circularity and reuse are expressed in several of the guidelines but the approach of the concept varies. At present, the use of language allows for different understandings and interpretations that make requirements in procurement difficult to interpret and hinder the possibility of creating comparable tenders. The long-term perspective is often lacking among clients and decision-makers, which leads to that sustainability values are not prioritised and thus do not become a guiding principle. Besides this, the time perspective is often so short that the choice of solutions that are more sustainable over time, both

environmentally and economically, is often discarded since short-term profitability is in focus (Malmgren, 2021; Göteborgs Stad, 2020a).

In this master thesis, the author's research shows that the number of organisations and projects that work with circular procurement in the construction sector today is small. Around ten to twenty pilot projects have been found in Sweden where reuse has been a focus area and some reports describing their process can be found. But information and practical examples regarding how procurement can be used as a tool to increase the use of reused materials has been very hard to find.

## 1.2 Aim

The aim of this master thesis is to investigate what role circular procurement has in increasing the reuse of building materials and products in the construction sector, as well as what requirements are needed in order for reuse to be more widely implemented.

The intended outcome is to give an overview of the construction sector's knowledge in reuse and procurement today, as well as what the main success factors and hindrances to requiring reuse in procurement are. The sector's application of requirements on reuse is also studied. Information about how organisations and companies can work with reuse in procurement and examples of how actors work with it today is presented. Besides this, a summary with completed reuse requirements that can be used in practice is compiled.

## 1.3 Research Questions

This report's main research question is:

- How can requirements in procurement increase the implementation of reused building materials and products?

To answer the main research question, three sub-questions are investigated:

- What are the main barriers/challenges to reuse linked to requirements and procurement?
- What are the main factors for a successful circular procurement with a focus on reuse?
- What is needed to make reuse a natural part of procurement in the construction sector?

## 1.4 Limitations

This master thesis focuses on the construction sector in Sweden and how procurement and requirements in both the public and private sectors can affect the development of reused materials and products. The main focus is on building materials and products such as bricks, tiles, windows and doors, and not furniture or decorations. The interview respondents were chosen from experience and knowledge regarding procurement and reuse and therefore no limitations were done regarding a specific actor, company, or geographic area within Sweden. Projects that include reuse of building materials or products were studied, and both new production, renovation, and reconstruction and demolition were taken into consideration.

## 1.5 Contribution to Theory and Practice

This study contributes in several ways to the field of urban development. Both from a perspective of how the actors in the construction sector can implement more reused materials and products in their projects and work with circularity in their procurement process. Whereas several previous studies have discussed the content of reuse and the barriers and solutions toward a more circular sector, this thesis provides an examination of what role circular procurement and requirements have in the development of reuse. It contributes with both a theoretical background to the subject and practical examples of formulated requirements for the implementation of reuse in both public and private projects. This report is relevant for actors who want to learn more about procurement and requirements connected to reuse and wish to see practical examples of how other actors have formulated successful requirements in procurement that have led to more reuse in their projects.

This master thesis has been carried out in a joint process between the two authors and the workload has been shared equally between them.

# 2

# Theory

This chapter is based on literature and will give a theoretical background on subjects that are of interest to understand how requirements on reuse can affect the circular development of the construction sector. Topics like public and private procurement, contract forms, incentives and requirements as well as current hindrances and solutions to circular procurement will be presented to give the reader a broad overview of the subject.

To succeed with a high degree of reuse in a project, it is important that the client already early in the process strives for a high level of reuse. To achieve a good result, reuse needs to be taken into practical consideration by the architects, demolition contractors, consultants, and building contractors who plan, facilitate, and execute the project. According to Gerhardsson et al. (2019), clients need to provide incentives for reuse for these actors, preferably in the context of procurement, to make projects with a reuse focus occur. It is less likely that these actors will initiate reuse themselves as they are primarily responsible for meeting the requirements imposed on them by property owners and tenants. The norm today is to use newly manufactured products, which can differ from reused products in terms of aesthetic and acoustic qualities, operation, life expectancy, and product guarantees. This puts actors who engage in reuse initiatives at increased risk when the outcome is not equivalent to the use of new products. To achieve reuse, it is therefore important that the property owners sanction this and provide solutions to new types of problems that might arise when handling used products instead of new ones. Procurement can work as a tool to enable increased reuse. The client can in the procurement documents, for example, (Gerhardsson et al., 2019):

- Set requirements on a specific amount of reuse.
- Provide financial incentives for reuse.
- Provide increased working time for reuse operations connected to reuse.
- Set requirements on experience and knowledge about reuse in consultants.
- Provide designers and contractors with detailed documentation, for example, a detailed reuse material inventory.
- Specify special provisions for reused products, for example regarding product guarantees and evaluation of material components.

- Set requirements for product documentation of new purchases.
- Assist with premises for storage during construction.

The potential for incorporating reuse requirements in procurement processes presents a significant opportunity for transitioning from linear to circular material management practices in the construction sector. The following chapter will provide the readers with fundamental knowledge on circular procurement and reuse, enabling them to better understand how to implement reuse requirements in practice.

## 2.1 Procurement

Procurement is the action taken by a contracting authority to assign a contract or enter into a framework agreement for products, services or construction works. In most cases, a tendering or competitive bidding process is used. The procurement process is designed to ensure that buyers obtain goods, services, or works at the most favorable price by comparing factors such as quality, quantity, time, and location. To minimise the risks of fraud and collusion, companies and public organisations often establish procedures that encourage fair and transparent competition for their business. When a public authority or government agency buys products or services through this practice, it is referred to as public procurement, and private procurement is when private companies or organisations enter an agreement with other firms (Konkurrensverket, n.d.-b).

Purchasing decisions typically involve considerations such as handling and delivery, price changes of goods, and marginal benefits (Upphandlingsmyndigheten, n.d.-b). Companies that prioritise corporate social responsibility may also require their procurement activities to take into account wider ethical and societal concerns. In the last few years, circular procurement has been on the agenda and today tenders can be evaluated on both the economic aspect and based on the total CO2 emissions (Svenska Miljöinstitutet, 2021b).

### 2.1.1 Public Procurement

Public procurement is the process that public organisation uses to make purchases with the aim of secure that organisations within the public sector open up their purchasing to competition. The procurement process in Sweden is monitored by The National Agency for Public Procurement (Upphandlingsmyndigheten). The mission of the organisation is to ensure efficient use of tax funds and promote fair business opportunities for EU companies in their dealings with the public sector. Procurement rules vary depending on the value of the purchase, with larger procurements requiring public tender announcements to increase transparency and accountability in spending public funds. The public tender announcements help to ensure that purchases are made based on business needs rather than personal interests, as purchasing organisations using public funds are subject to stricter regulations compared to private actors (Upphandlingsmyndigheten, n.d.-d). By following public procurements in line with the legislation, serious actors are promoted and unserious

suppliers are hindered. Clear rules and policies with effective control and revision and transparency in the decision-making process increase the chances of keeping bribery and corruption away (Konkurrensverket, n.d.-a).

The Swedish public procurement has an annual turnover of about SEK 800 billion. This corresponds to almost a fifth of Sweden's GDP which means that it has a big effect on not just individual companies but also the total value creation. When public procurement is used in a strategic way, there are great opportunities to drive progress toward a more sustainable society by demanding socially and environmentally sustainable products and services (Upphandlingsmyndigheten, n.d.-d).

In 2016 a new law (2016:1145) was implemented in Sweden about public procurement (Lagen om Offentlig Upphandling, LOU) together with a number of other laws connected to public procurement in different sectors. These were based on a new EU directive that included an important change regarding sustainability. The new law aims to increase focus on social and environmental-related criteria and gives greater opportunities to consider other factors than just the economic one. One example is that lifecycle costs can be taken into account in tenders (Colligio, 2019).

In general, the following rules apply to requirements in Swedish public procurement (Colligio, n.d.-a):

- The requirements must be linked to what is being procured, not to who is delivering it.
- It must be possible to control and monitor the requirements.
- The requirements should not be vague but clearly linked to the objectives and must be proportionate. However, they must not have a measurable outcome.
- The requirements must not favour or disadvantage certain suppliers.

Colligio (2019), experts in circular procurement, are critical to some of the mentioned requirements in public procurement. The principle of not favouring or disadvantaging certain suppliers can disfavour organisations who work with sustainable products and the procurement can therefore counteract sustainability work. Colligio (2019) also claims that by not demanding measurable requirements, improved sustainability outcomes can be hard to achieve. If, for example, a functional procurement is applied, it is hard to know whether the sustainability results get better than a classic procurement. But it is worth trying since there is no demand for measurable outcomes.

### 2.1.2 Private Procurement

Private procurement is a procurement approach that allows private companies to operate outside of traditional procurement laws. This enables private companies to potentially engage in preferred supplier arrangements or continue working with suppliers they have previously collaborated with (Mercell Opic, n.d.). According to Upphandlingsmyndigheten (n.d.-d), private procurement has a faster process than public procurement. The procurement process in the private sector varies from pub-

lic procurement, particularly in terms of evaluation and negotiation stages. This means in the evaluation of tenderers, the client has the ability to *"prequalify one or more consultants or contractors who meet the requirements"* specified in the invitation documents (M. Karlsson, personal communication, 12th November 2021). After the evaluation of tenderers and possible prequalifications, the private sector has the opportunity to negotiate with one or more tenderers about specific issues. The negotiations can be about for example technical solutions, time schedules and the offered price.

## 2.2 Circular Procurement

Circular economy is seen to be one of the solutions to achieve a sustainable society by the business, politics, and research industries. Despite this, circular procurement is a relatively new concept in the field of procurement (Svenska Miljöinstitutet, 2021a). Both public and private procurement are strategic tools for sustainable development. Circular procurement refers to procurement that promotes the transition to a circular economy and aims to procure circular products and services that have a significantly lower climate and environmental impact than traditional products (Upphandlingsmyndigheten, n.d.-b). Circular procurement is in a state of growth and is based on research on sustainable and green procurement.

It is essential to know that circular procurement differs from other types of procurement. Green and sustainable procurement strives for environmentally friendly material, but circular procurement aims to reuse, reduce, redesign, recycle, and regenerate to achieve zero waste. Circular procurement and circular economy strive to give material new life and new industrial connections in different supply chains. The difference between circular procurement and typical environmental-friendly procurement is that the latter does not include new cycles that eliminate waste (Qazi & Appolloni, 2022).

According to Lindeberg & Ryding (2020), a more circular economy and procurement process can be achieved, for instance, by:

- investigating whether the need for purchasing actually exists or whether it could be met in a different way.
- setting functional requirements in procurement to allow for more innovation and new solutions.
- keeping existing goods as long as possible by repairing and maintaining them.
- setting circular requirements in procurement and exploring the possibility of purchasing products made from recycled materials.
- design constructions and products that easily can be dissembled.

It is hard to achieve circular material management without demanding it in procurement (Upphandlingsmyndigheten, n.d.-e). The client plays a vital role and bears responsibility in formulating procurement requirements that outline how the project

will prioritise circularity and designate responsibility for its implementation. By setting clear requirements for product and material selection, transportation, and CO2 emissions during construction and installation, the client can significantly affect the project's climate impact.

### 2.2.1 Laws and Regulations within Circular Procurement

Circular procurement is not only related to the environmental impact but also to the broader perspective of sustainability that includes the social and economic dimensions connected to circular economy. A procuring authority has the freedom to define and decide, among other things, what to procure and what added value that should be rewarded, as long as the basic procurement principles are respected. Upphandlingsmyndigheten (n.d.-b) considers that it is possible to set driving requirements which go beyond EU-regulated legislation. By setting environmental requirements in procurement, authorities and organisations can contribute to achieving environmental quality objectives and generational targets. Basically, it means integrating circularity aspects into purchasing policies and strategies (Upphandlingsmyndigheten, n.d.-b).

In 2008, the EU adopted the communication plan "Public Procurement for a Better Environment" and has since then worked intensively to develop criteria for environmentally sustainable procurement in the context of what they call "Green Public Procurement" (Colligio, 2019). A few years later, in 2015, the UN launched the "Sustainable Development Goals", where goal 12 is called "Ensure sustainable consumption and production patterns" and subgoal 12.7 is about promoting public procurement practices with a sustainability focus (United Nations, n.d.). In 2018, the government of Sweden appointed a delegation for circular economy and one of the focus areas was public procurement (Colligio, 2019). In the National Procurement Strategy made by the Ministry of Finance in Sweden (Finansdepartementet), seven strategies have been brought up to fulfil the goals regarding public procurement, and among other things, achieve the Swedish Environmental Goals. One of the strategies in the National Procurement Strategy is *"Environmentally responsible public procurement"*. Finansdepartementet (n.d.) means with this strategy, public procurement with requirements on services and goods can have a significant role in Sweden's sustainable development.

## 2.3 Procurement Strategies for Reuse Projects

In order to achieve procurement with good results, Saija (2022a) recommends not to procure the entire reuse process within the same procurement. Instead, reuse services like reuse consultants and reuse inventory should be procured separately and be used to identify and clarify the potential and scope of reuse in the project. Only when more needs are identified other elements of reuse, such as temporary storage, should be procured.

Regarding the procurement of reconstruction and new production, it is possible to request and prioritise reused products in the tender. According to Saija (2022a), it

is in general hard to specify that a project shall contain X% reused materials and it is hard to monitor follow-up if it has succeeded. A more efficient strategy is to determine which products typically have a high potential for reuse. Once these have been identified in a 'gross list', the next step should be to select which products should be prioritised and graded based on e.g. form, function, availability, CO2 value, etc. which gives a 'netlist'. In the netlist, it is possible to set a target for product X to have a reuse rate of X%, for example, that 50% of all doors in a project should be reused.

The client can use financial incentives as a strategy to implement more reuse in their projects and to convince contractors to be a part of their reuse project (Colligio, 2019; J. Andersson et al., 2018). The financial incentives can, for example, be in the form of giving the architect, demolition contractor, consultant, and building contractor a share of the financial profit that can occur as a result of reuse, mainly in the form of reduced purchasing costs. In cases where the client has central reuse goals in their organisation, it may also be valuable to pay extra to get the contractors to achieve higher reuse rates and thus contribute to achieving the client's business goals. Financial incentives can be formulated, for example, as an increased payment for each kilogram of product reused, or in more detail, depending on the type of reuse performed. It is also necessary to consider providing contractors with incentives for increased time and budget, such as disassembly, reconditioning, and reassembly of products or extra time spent planning for reuse and searching for used products for purchase (Gerhardsson et al., 2019).

The number of financial incentives is today few, which according to J. Andersson et al. (2018) is mainly due to a lack of knowledge and standardised habits that do not give room for innovative tools and work processes that encourage reuse. One incentive which can be essential in order to get contractors interested in reuse is material mark-up for purchased goods and materials (Saija, 2022b). This since material mark-up is an important part of their business model and profitability. Contractors may face economic challenges when choosing reused materials and products instead of new ones, as they may lose income from material mark-ups. To provide incentives to contractors and make reuse economically profitable, it is possible to offer the same mark-up for reused materials as for newly produced materials. Alternatively, it may also be an effective strategy to compensate contractors through increased payment for their work, rather than relying solely on mark-ups.

## 2.4 Contract and Collaboration Form

The form of contract used in a project does not only determine the party responsible for the final outcome, but also influences the overall process of the project. The two main types of contracts in use today are Design and Build contracts (also known as Turnkey contracts) and Construction contracts (also referred to as Execution contracts or Traditional contracts)(Boverket, 2021). Depending on the type of contract applied, the conditions for the project will be different, which means that circular construction and demolition processes will need to be implemented in different ways.

To shift the construction sector towards circular solutions, innovation-driven procurement is needed. The overall goals in projects should include maximising reuse, something that can lead to a transition where the reuse market will grow and reused materials and products are in higher demand (Göteborgs Stad, 2020b). Saija (2022a) states that when choosing the form of contract and procurement, it is important to examine the advantages and disadvantages that exist as it can play a significant role in projects which include reuse. According to Göteborgs Stad (2020b), the potential to run an innovation project is the same for both Design and Build contracts and Construction contracts, but the responsibility for innovation differs between the actors. The difference is that: in the case of Design and Build contracts, it is important to include functional descriptions and circular award criteria in order to create circular innovation among building contractors; in the case of Construction contracts, it is the client organisation that is responsible for the innovation rather than the contracting actor.

### 2.4.1 Design and Build Contract

In a Design and Build contract, the contractor is responsible for both project planning and execution of the work, including hiring necessary consultants. In addition, the contractor is responsible for ensuring that the drawings and construction documents are executed correctly (Nobel, n.d.). Furthermore, for the Design and Build contract, it is important to "*...clarify requirements and include climate-saving measures such as reuse in procurement*" (p.13)(Saija, 2022a). For contractors to effectively contribute to activities aimed at reducing climate impact, it is crucial to early establish environmentally friendly work routines and what the project's main goal is. This may involve determining the types of materials that are allowed for use in the project, among other considerations (Thyrsin et al., 2022).

One of the disadvantages when having a Design and Build Contract, mentioned by Nobel (n.d.), is that the client becomes *"completely dependent on a single contractor"*. Another downside of a Design and Build contract is when the client wishes to have detailed management and control over specific aspects of the project. Additionally, the costs associated with this type of contract tend to be higher compared to cases where the client assumes greater responsibility (Nobel, n.d.). Apart from the drawbacks mentioned, there are also notable advantages to choosing a Design and Build contract. Boverket (2021) means that one advantage of Design and Build contracts is that those who have knowledge of the subject also have greater responsibility for that particular element. This gives assurance that a suitable person is responsible for their expertise area.

### 2.4.2 Construction Contract

In a Construction contract, HSB (n.d.) means the contractor is not involved in the project planning and is therefore only responsible for completing the work and has no functional responsibility. Göteborgs Stad (2020b) states that in a Construction contract *"...some elements can be broken out and procured as a functional procurement in the form of an innovation procurement"*(p.41).

Thyrsin et al. (2022) means that in this type of contract, the construction documents established by the client will have an impact on the possibility to require the contractor to meet climate requirements. Due to this, it is important that the client has considered climate performance at an early stage. However, it is a balancing act because the more that is decided by the client at an early stage, the less the contractor can find solutions to reduce the climate impact, such as using alternative building materials.

### 2.4.3 Partnering

Partnering is according to Byggherrarna (n.d.) not a form of contracting but rather "*the name of collaborative activities and tools developed to collaborate in a structured way on the execution of the construction project*". Thyrsin et al. (2022) states that partnering can be used in both Design and Build contracts and Construction contracts, and can be helpful when it comes to reducing the climate impact of buildings. Furthermore, Saija (2022a) means that partnering can be beneficial in projects who not have defined and clear goals, including projects that want to integrate reuse. Making changes at a later stage, such as including reused materials, can be easier in partnering. The prerequisite here is that all actors involved in the project understand that not everything is decided from the beginning.

A helpful aspect of partnering is that the client and the contractor together can define collaboration aims based on the procurement requirements and calculation instructions. Thyrsin et al. (2022) means that this can be beneficial when there at an early stage in the project are difficulties in defining clear aims and what climate improvement actions need to be done to achieve the goals. Partnering enables more flexibility during the construction period, such as introducing reused materials and products at a later stage (Thyrsin et al., 2022). In addition, as risk-taking may become an issue in reuse projects, Strand Nyhlin & Åfreds (2022) states that partnering may be preferable in these projects. This is because it involves incentive agreements whereby the client and contractor share additional costs and profits.

## 2.5 Incentives and Requirements in Procurement

To increase the implementation of reuse in the construction sector, clear incentives guided by clear regulations need to be stated to push actors to develop green, sustainable, and circular procurement. It also requires that the client in question is aware of the level of demands to be set. Both the client's competencies and awareness will differ greatly depending on how they set requirements in the procurement. The client can either set visionary and ambitious goals or put specific demands with subsequent consequences in the procurement. The aim of visionary goals, in other words, function-based requirements, is to challenge contractors and suppliers to innovate new working methods and products according to their own ambitions. Clear requirements, or detailed-based requirements, require that the client have greater expertise and take a more active role in supporting the other partners in the project (Waern, 2021).

### 2.5.1 Function-Based Requirements

One way for clients to engage in sustainable and circular procurement is to formulate function-based requirements (Malmgren, 2021). This means that the requirements specify *what* is to be achieved rather than *how* it is to be achieved (Upphandlingsmyndigheten, n.d.-a). A function-based requirement can for example be to specify characteristics and performance but not demand a specific supplier or a specific colour. With flexible project planning from function-based demands, the use of reused materials and products can easier be enabled since it is not limited to a specific brand or design. Waern (2021) describes that function-based requirements have been developed to be implemented as any requirements list, making it easier to be used by non-experts. The requirements can therefore be formulated in terms of carbon dioxide emissions or the number of recycled materials in the project. Moreover, Waern (2021) highlights that with function-based requirements, it is reasonable that the client already has assumed in the tender documents that the form of contract will be agreed upon according to functional requirements. The client then submits the tender documents with requests on design, form, quality, and functional characteristics. A particularly important aspect in the case of function-based requirements is the monitoring and follow-up, which puts greater demands on the contracting process itself, but also on the relationship between the parties.

### 2.5.2 Detail-Based Requirements

The opposite of function-based requirements is detail-based requirements. These are more common in procurement today and specify detailed demands of the characteristics of the product or how the service is to be performed. When detail-based requirements are set, it demands that the procuring organisation has deep knowledge of the product, service, or construction work to achieve a successful outcome of the procurement (Upphandlingsmyndigheten, n.d.-c).

### 2.5.3 Placement of Reuse Requirements in Procurement Documents

The requirements regarding circularity and reuse can be placed in several procurement documents. Exactly where in the papers they should be placed depends on a number of things, including what is being procured, what procurement procedure is being used, and whether a template is being used. Colligio (n.d.-b) prefers for the sake of simplicity to either write a procurement document in custom format or use AMA AF 12 (Administrativa Föreskrifter för Byggnads-, Anläggnings-och Installationsentreprenader). AF are the regulations, advice, and instructions for the construction and renovation of housing. They are referred to as AMA and are numbered according to the year in which they were drawn up and the type of construction involved. AF applies to the preparation of tenders for contracts. The most current parts of AMA AF 12 refer in turn to AB 04 (Allmänna Bestämmelser för Byggnads-, Anläggnings-och Installationsentreprenader) for 'Construction contracts' or ABT 06 (Allmänna Bestämmelser för Totalentreprenader) for 'Design-and-Build contracts'.

In public procurement of contractors (construction, demolition, installation, etc.), the Administrative Instructions, AMA AF 12, structure by Svensk Byggtjänst is often used and it is divided into five main sections (Samuelsson, 2012):

1. AFA - General Introduction
2. AFB - Procurement Instructions
3. AFC - Contract instruction in the case of performance contract
4. AFD - Contract instruction in the case of design and construct contract
5. AFG - General works and construction aids

## 2.6 Hinders and Opportunities in Circular Procurement

When reading generally about reuse, and especially about reuse in procurement, several hindrances can be identified and confirmed by researchers. Lindeberg & Ryding (2020) among others mention that the barrier that the literature mainly highlights are a lack of knowledge of research results and practical experience in the area, lack of policy instruments, and a lack of information from public authorities and procurement support bodies. Strand Nyhlin & Åfreds (2022) mention both quality and guarantee as well as difficulties in formulating procurement as a hinder for reuse to be more implemented in the construction sector. Colligio (2019) agrees on several of the mentioned hindrances and also points out contract monitoring as a recurring challenge that needs to be handled for reuse projects to be more successful. The barriers to reuse together with solutions, based on the literature, will be presented in the following chapter.

### 2.6.1 Lack of Clear Political Initiatives

Circular economy is a subject that has been on the political agenda for about the last fifteen years, particularly on the European level. It is a diverse concept that includes several social activities, but unfortunately, the idea of circular procurement has been overshadowed in many debates.

Lindeberg & Ryding (2020) emphasises that in several key policy documents from authorities, the significance of public procurement as an effective tool in the work of climate policy has been forgotten. For example, in a report by the Swedish Environmental Protection Agency (Naturvårdsverket) with connections to the government's climate policy, public procurement is not even included. This is even though the report discusses how policy instruments affect greenhouse gas emissions linked to our consumption.

The Swedish government's climate policy action plan (Regeringens klimatpolitiska handlingsplan) also includes issues related to public procurement. The government has stated that Sweden should be at the forefront and continue to be a role model in

terms of environmentally adapted public procurement and that the life cycle perspective should be taken into account in the various phases of procurement (Lindeberg & Ryding, 2020). However, there are vague directives on what direct activities should be undertaken to reduce climate emissions, something that is desirable according to both Lindeberg & Ryding (2020) and Wigren Skogseid (2019).

Despite that the positive publications about increased circularity have increased in the last years, Strand Nyhlin & Åfreds (2022) still believes that there are too few policy instruments and legal requirements that in a clear way push the construction sector towards increased reuse. New production is still a norm despite that maintenance, reuse, and renovation should be encouraged. More decisions should be taken to require public authorities to make more demands on circularity and reuse in their procurement.

In 2020, Sweden got a new law regarding waste management that includes requirements in making material inventories in projects. But despite this, there is still no requirement or regulations about using the identified material in practice (Strand Nyhlin & Åfreds, 2022). The public procurement law is also hindering the opportunity to receive reused materials and products as it is forbidden for public authorities to receive or donate objects of value (Wigren Skogseid, 2019). According to the Municipality Law (2017:725) it is not allowed for municipalities or regions to donate products as they can not favour certain residents over others (Sveriges Riksdag, 2017). They can either donate a product internally, to another business in the organisation such as a reuse platform or sell it externally. Despite this, there is room for interpretation on how this should be handled, making it a perceived hindrance (Circular Hub, 2020).

However, Saija (2022b) claims that even though actors see laws and/or regulations as a major challenge, no specific laws or regulations can be pointed out as a barrier to reuse. In the baseline study made by Saija (2022b), few actors stated that procurement rules have been a hindrance when working with reuse in practice. Saija (2022b) concludes that this might be due to the fact that there are still very few projects with experience in procurement and reuse, especially on a larger scale. It is clear that there is currently a lack of experience in working with reuse, which is why practical procedures are missing for how regulations and legal requirements should be interpreted and applied. This creates uncertainty, which in itself creates an obstacle to daring to start working with reuse.

### 2.6.2 Lack of Support and Guidance in Circular Procurement

Today, there is limited support for procurement and few documents to use as a basis when working with circular procurement. In the public procurement law, the word circularity is never mentioned and reuse is mentioned only once, which Lindeberg & Ryding (2020) find noteworthy. The same applies to the National Procurement Strategy, where the words reuse and circularity are never mentioned. One reason for this can be that the pre-work for the current procurement law is based on the

EU directives from 2014, a time when linear material flows were the standard. Since each EU country can adjust the EU directives in national laws based on their own conditions, there is a possibility for the country's government to add an additional wording on circular procurement if this is considered relevant (Lindeberg & Ryding, 2020). The Swedish government has reuse on its agenda but it is hard to find clear writings on how the construction sector shall work with reuse in particular. In June 2022, the government presented a draft law describing that all procuring authorities shall take climate and environment into consideration. The government has also decided on a budget initiative and a special assignment to the Swedish National Board of Housing, Building and Planning (Boverket) on circular economy in the construction sector to promote increased reuse and recycling of construction waste (Strandhäll, 2022).

There is not just a lack of information about circular procurement in public documents, but also at most authorities and on central procurement support. Some information about circular material flows is included in government reports but most of these are of investigative character and not as detailed or practical as the construction sector primarily needs (Lindeberg & Ryding, 2020). Landahl et al. (2020) highlights that to make a change and work toward circular construction, it is necessary to work with shared requirements and that the authorities create clarity towards the industry. A prerequisite for this is a systematic methodology for measurements and material inventories in order to achieve good results and to give tools to follow-up requirements and measures. To make it easier to work with circular procurement, the threshold to start working with it needs to be low, and clear information about how to work with it in an efficient and successful way is crucial. If it is too hard to access information from authorities, it will be a time and financial cost that hinders more organisations to implement more reuse in procurement (Landahl et al., 2020).

### 2.6.3 Insufficient Incentives and Market Conditions

Some practical factors have also been identified as hindrances that oppose the development of circular procurement (Lindeberg & Ryding, 2020). Some of them are:

- Lack of market conditions for increased reuse (e.g. due to high costs).
- Need for clearer non-economic motives and insights into the values of circularity.
- Insufficient market incentives to promote circular materials and products.

These barriers have been seen to be especially appearing within the construction sector. According to Lindeberg & Ryding (2020), this indicates that it is mainly in this sector that the conditions for circular procurement are discussed or tested to a greater extent. Lindeberg & Ryding (2020) highlights Boverket's government mission about building's climate effect that with time led to a new draft law regarding climate declarations for new construction. It was noticed that it was hard to get an understanding of the need for life cycle analysis (LCA) calculations and that such documents were perceived as unnecessarily complex. From Boverket's mission,

practical experiences from construction sites also show that many actors are good at sorting and recycling building materials of various kinds, but that the use of reused construction and demolition materials has not progressed as far (Lindeberg & Ryding, 2020).

The need for cooperation and interaction with other market players to learn from each other and build a new market has also been seen as an important step towards more reuse. Setting requirements in procurement is an important tool for influencing when the municipality itself is the developer according to Landahl et al. (2020). The need for brave and knowledge building, both within their own organisation and in the local area are crucial factors for a successful implementation of reuse within procurement. This is a barrier when talking about reuse in the construction sector, where there is a lack of knowledge development and exchange of experiences between projects about reuse in general.

Another hindrance is the building permit process connected to reuse (Strand Nyhlin & Åfreds, 2022). In order for it to be easier to implement reuse, the process of building permits needs to be more flexible. It should be possible to grant building permits even though information on the exact materials to be used may be lacking early on in a reuse project. As the market is still a bit unstable, it can be hard to define the exact colour or material type at an early planning stage. Strand Nyhlin & Åfreds (2022) writes that a time incentive in the building permit process is desirable for those who have included reuse.

### 2.6.4 Difficulties to Formulate Procurement Requirements

There is an uncertainty expressed by the construction sector actors about, for example, what requirements may be set, how requirements and criteria should be formulated to have the right effect, how requirements for demolition should be designed, what circular procurement means, and what is meant by reusable products (Landahl et al., 2020). Wennesjö et al. (2021) points out that clients need to build knowledge on how to formulate project specifications and requirements so that the right conditions are created for the remaining part of the project. Many actors are used to following existing procurement templates and general regulations and feel uncomfortable adding their own wording. The procurement consultant Erik Årling states that *"No major rewrites are needed. The important thing is to start doing something. Dare to enter the market with a tender request and see the reaction"* (Strand Nyhlin & Åfreds, 2022)(p.15). Another consistent trend regarding procurement is that actors find it difficult to propose and draft new procurement ideas to stakeholders, even if they are based on objective and reliable data. It is a sign that stakeholders needs to increase their knowledge about reuse and the profitable aspects of it (Lindeberg & Ryding, 2020).

### 2.6.5 Lack of Follow-Up on Sustainability Requirements

A recurring challenge, particularly in public procurement, is contract monitoring. A lot of energy is often spent on the procurement phase itself, but then procurement

managers are often forced by resource constraints to move on to the next procurement once a contract is signed and do not have time for follow-up (Colligio, 2019). If the demands in the procurement are not followed up on, the supplier can choose to accept requirements that they themselves know they cannot or will not meet. When setting requirements, it therefore needs to be clear about when a requirement must be complied, how this will be checked, and what the consequences will be if the requirement is not met (e.g. penalties). An important tool in this context, which is often forgotten, is bonuses. As a client, instead of a penalty with demands and fines, you have the possibility to use an incentive in the form of a bonus that a supplier receives if they achieve/comply with certain environmental requirements (Colligio, 2019). By evaluating the effect of adding reuse in procurement and communicating the result, the development process can spread faster (Landahl et al., 2020).

### 2.6.6 Quality and Guarantee

One of the hindrances when it comes to the use of reused building materials and products in the construction sector is the question about quality and guarantee. According to Strand Nyhlin & Åfreds (2022) there is a fear in the sector of using reused building materials which has a lack of information. Another related barrier to reuse is not knowing how long the remaining lifetime of the reused material is, as this can be difficult to assess on a material that is not new. Wennesjö et al. (2021) means that the sector has no standard system for ensuring quality and guarantee issues in relation to reused building materials. Göteborgs Stad (2020b) agrees with this and states that the development of a certification system is needed for reused products *"to increase incentives and minimise risks for the buyer when purchasing these reused products"*(p.19).

According to Konsumentverket (2022) it is up to the company itself to decide whether or not they want to provide a guarantee on their product. If a company chooses to set a guarantee it is important to specify the circumstances under which the guarantee will apply, for example, for how long the guarantee will be valid. It is also possible to frame the guarantee according to the characteristics of the goods that are guaranteed.

Also, Wennesjö et al. (2021) means this is necessary for reuse to become established on a larger scale and that there is a desire for more reuse actors to enter the market which also offers quality assurance and guarantee on the reused product. When products lack full product information, such as acoustic and fire classification, as well as chemical content, there is a problem with guarantees and safety, and the material or product may be disqualified as reusable. When it comes to the requirements which the client set for the contractors, the guarantee requirements need to be adapted to reused products. Göteborgs Stad (2020b) means that reasonable requirements need to be set when it comes to reused products. When working with reused materials it is not possible to sign guarantees in the same way as the construction sector is used to.

# 3

# Methodology

The chosen research methodology to meet the aim and the research questions of this study was a literature review and an interview study. Since the main focus of the study was to investigate how the construction sector is working with requirements for reuse in procurement today, a qualitative research process has been used. This chapter includes descriptions of how the study has been conducted in terms of research approach, data collection, and ethical considerations together with a reflection on the chosen methodology.

## 3.1 Research Approach

To meet the aim and the research questions, an abductive research approach, or in other words a systematic combining, has been used (Dubois & Gadde, 2002). An abductive process is described as a continuous movement where empiricism and theory are studied in several rounds, going back and forth in order to see things that otherwise might be missed. Dubois & Gadde (2002) describes this approach as beneficial and by combining the initial literature study with other research activities such as interviews, the understanding of the area can become more expansive, and knowledge from different sources can help match the theory with reality. This process can lead to additional aspects and refinements of the study, so a redirection of the theoretical framework might be required. In figure 3.1, an example of a systematic combining approach is illustrated.

This study has adopted a qualitative research approach with a focus on verbal descriptions rather than focusing on values of quantities and variables that defines quantitative research (Silverman, 2015). In order to follow the qualitative approach and seek an understanding of the subject, the research questions were formulated with a varying level of accuracy (Bell et al., 2018; Silverman, 2015). Moreover, data was generated from existing literature, and by conducting several interviews to form a holistic understanding of the subject. Although the study uses direct examples from reality, it is still within the area of qualitative research. According to Bell et al. (2018), qualitative research frequently uses examples from social reality to get clear and direct knowledge of a social setting to provide a wide understanding.

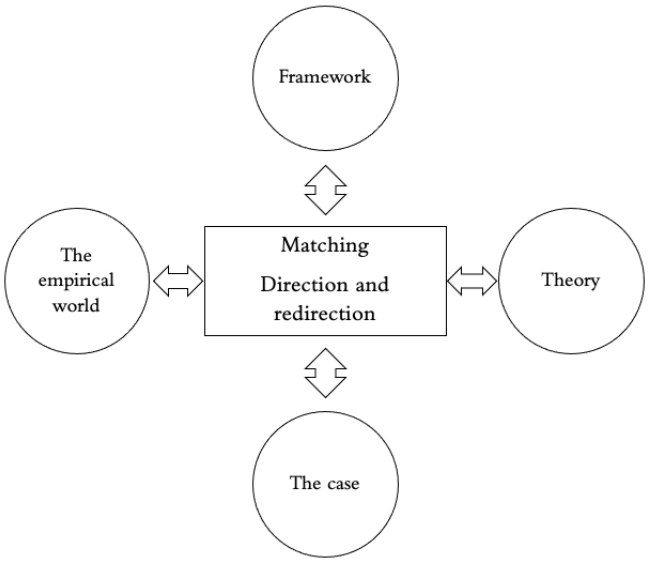


**Figure 3.1:** The process of Systematic combining, adapted from Dubois & Gadde (2002)

## 3.2 Literature Review

In the initial phase of the study, a review of existing literature regarding reuse in the construction sector was conducted. The aim was to gain information and knowledge about the subject, to get an overview of results from previous studies as well as what areas that are in need of further investigations. The first review was done prior to the interviews to create a foundation of knowledge of the subject and expand the perspectives on the challenges in organisations connected to reuse and circularity. However, since the study follows an abductive process, the literature review was conducted with an iterative approach, suggested by Dubois & Gadde (2002). This means that the literature review had multiple cycles along the study and when new observations were found along the way, new approaches and angles had to be studied and included in the study. The main literature research was obtained by searching for relevant keywords to the subject in Google Scholar and Chalmers database. These keywords include *reuse, procurement, requirements, construction sector, circular building, circular procurement* and *material flow*. The search was made with a critical evaluation of the sources with a main focus on contemporary literature. Additionally, some literature was found on subject-related networks or provided by supervisors.

## 3.3 Interview Study

Since the research approach for this study is qualitative, interviews are according to Bell et al. (2018) the most common method and can be conducted as the primary source of data. In qualitative studies, there are two main types of interviews: semi-structured interviews and structured interviews. Since the research questions in

this study are with varied explicitness, the semi-structured method was embraced. The process of semi-structured interviews is flexible which allows the interviews to follow up on topics outside of the interview guide and the prepared questions. The advantages of this are that topics that are relevant to the study can be deepened and the interviewee can follow up on topics that are more of interest and of great importance to the study (Bell et al., 2018).

Before the interview process started, dialogues were initially held with the supervisors of this master thesis, namely an artistic professor in architecture, a project manager, and an environmental strategist. This is to get a better understanding of the issues connected to the subject and to find an appropriate angle of reuse in the construction sector. With help from the supervisors, suggestions on key actors relevant to the interview study were identified and contacted. The nine actors interviewed can be seen in table 3.1 together with their company name, role and interview date. The selected interviewees had different roles and were from different organisations in order to get a wide perspective of the subject.

**Table 3.1:** Presentation of the interview respondents.

| **Name** | **Company** | **Role** | **Interview Date** |
|---|---|---|---|
| Anna Bernstad | Malmö Stad | Sustainability Strategist | 9 March 2023 |
| Cecilia Hornö Eriksen | Mölndals Stad | Sustainability Manager | 8 March 2023 |
| Erik Årling | Colligio | Procurement Consultant | 8 March 2023 |
| Joakim Kaminsky | Kaminsky Arkitektur | Architect | 9 March 2023 |
| Johanna Andersson | Svenska Miljöinstitutet | Expert in Circular Construction | 1 Mars 2023 |
| Jonas Dahlstrand | Projektutsikter | Project Manager | 20 February 2023 |
| Josephina Wilson | Familjebostäder | Architect and Project Developer | 17 February 2023 |
| Karin Hedén | White Arkitekter | Sustainability Coordinator | 17 February 2023 |
| Lotta Zachrisson | Peab | Environmental Specialist | 13 April 2023 |

When developing the interview questions, the research questions were used as starting points. Based on these questions, interview questions related to the topic were formulated. The interview questions, which can be found in Appendix A, were categorised to help the respondent understand the context. The questions were generally the same for all respondents, with some of the questions being modified or extended depending on the interviewee's expertise area.

The interviews took place in February, March, and April of 2023, both in person and online through Zoom and Teams. The two authors were present at all times and the interviews took approximately 45-60 minutes each. The interviewers were conducted in Swedish and quotes in this report have been translated and approved by the respondents. During the interviews, notes were taken, and audio recordings were made so that it would be possible to listen and capture important information at a later stage. After the interviews, the responses were summarised and the most important ones were extracted and contributed to the discussion and conclusions of the report.

## 3.4 Etichal Considerations

To take ethical aspects into consideration, the interview respondents were asked at the beginning of the interview if they wanted to be anonymous and if the interview could be recorded. This was to give respondents the opportunity to be anonymous in their answers if they had opinions they did not want to share in their public role. All respondents confirmed that their name, role, and company name could be published in the report and that the interview could be recorded. By presenting the respondents' names and professional roles, the authors believe that the report is more clearly anchored to practice and the readers can get a good overview of some actors that have experience and knowledge in the subject. Anonymous presentations of the respondents were considered, but the authors of this thesis believed that public names would give a more impactful report that contributes to the development of reuse in procurement. To ensure correct quotations, facts, and interpretation of the result, the respondents were given the opportunity to review the result of the interviews before the report was published. In the chapters of interview findings and discussion, the respondents names has been presented when they express their opinion rather than fact. In many cases the respondents agreed with each other and therefore individual names were not clarified in these cases.

In accordance with GDPR, the recordings, and notes from the interviews were deleted when finishing the report.

## 3.5 Reflections about Chosen Methodology

As mentioned in chapter 3.1, this study has been conducted based on an abductive research approach. This has been beneficial in many ways, firstly with the possibility of comparing literature research with the respondents' opinions. Generally, the literature did have a more overviewing angle of the subject while the respondents often referred to practical examples. Secondly, the abductive research approach was beneficial since the interviews could be based on the theory and the interview questions could be adapted when the theory developed. At the same time, the theory could be developed as the interviews provided new perspectives.

A potential improvement of the study would have been to conduct more interviews in order not to be limited to the opinions of individuals. More respondents would have strengthened the report and given a broader view of the construction sector's viewpoint of the subject. The reason why more interviews were not conducted is due to lack of time but also the difficulties in finding respondents who were interested in participating and had knowledge and experience in the subject. The authors could also have conducted a second round of interviews to investigate whether the given result is applicable in practice. Again, the time limit and trouble in finding new respondents was the limitation.

The authors believe that the interviews have been trustworthy as several respondents confirm each other's views and had backup from the literature. When the respondents agree on not being anonymous, the connection to practice was strengthened

as they would not want their names to be connected to false facts. There is a risk that the respondents could have embellished their answers connected to their organisation's work with reuse. The authors find this risk low since the respondents have been critical of both their individual performance in working with reuse as well as the organisation's improvement opportunities.

The chosen literature is considered to be reliable and up to date as most of the sources are published in the last decade and have been selected from authorised publications. Since many sources are from Sweden they are considered relevant to the topic and well connected to the practice and legislation in Sweden. A potential improvement could have been to check the sources against other sources through the method of triangulation. This has been done to some extent, but due to the lack of relevant sources dealing with the subject area, this has been difficult in some cases.

# 4

# Interview Findings

The interviews conducted in the process of this master thesis have resulted in valuable insights about reuse and how to require it in procurement. The respondents have in most of the cases agreed on what the main factors of success are as well as what the hindrances are. In the interview study, the opinions differed the most regarding whether if and how laws and regulations can hinder reuse. The following chapter brings up this and other factors such as contract and procurement form, how laws and regulations affect procurement, quality and guarantee, time and economy, knowledge and attitudes as well as communication and collaboration.

## 4.1 Presentation about Interviewees

The interview respondents were selected based on their experience in construction projects that to different extents have included reuse. To get a broad view, the respondents represent different actors in the construction sector, both the client, consultant, and contractor sides. Below the respondents' roles and experiences regarding reuse and procurement are described.

- Anna Bernstad works today as a Sustainability Strategist at Stadsfastigheter in Malmö Stad. Over the years she has been involved in several projects which have included reused materials and products in the region of Gothenburg and Skåne.
- Cecilia Hornö Eriksen has since 2022 worked as a Sustainability Manager in Mölndals Stad and before this, the has work at a big contractor firm for several years. She has been involved in the project Lyftet, which is a group of projects including new preschools and educational facilities in the city of Mölndal. In Lyftet, reuse has been an additional element and has not been a part of the procurement process.
- Erik Årling works as a Procurement Consultant at Colligio, which is a public procurement consultant company. He developed sustainable procurement and requirement templates and educated organisations in to work more with circular procurement.
- Joakim Kaminsky is an architect and the owner and founder of the firm Kaminsky Architecture. He has been involved in several projects where reuse

has been a part of procurement documentation, both as an architect and a reuse consultant. These projects have mainly involved interior design and renovation of commercial buildings, both loose fittings and furniture. He also has experience with projects where there has been reuse of, for example, lighter building components and frame completion.

- Johanna Andersson is an Expert in Circular Construction at Svenska Miljöinstitutet (IVL). She works on development projects and not on specific construction projects. She is involved in Centrum för cirkulärt byggande (CCBuild) which is a non-profit company where all revenues are reinvested in the business. In CCBuild, construction sector actors can interact on issues regarding reuse and circular material flows and share knowledge and experiences with each other.
- Jonas Dahlstrand works as a Project Manager at the consultancy company Projektutsikter where he also is CEO. He was the project manager for the construction of Chalmersfatigheter's project, the visitor center Onsala Rymdrum, where the procurement was based on CO2 equivalents. The project set high goals for reuse and it ended up with around 50% reused materials and products in the result.
- Josephina Wilson is an Architect and Project Developer at Familjebostäder. Since 2020, she has been running Familjebostäders' reuse work. Josephina has been involved in two projects where reuse has been in focus, a reconstruction project of an apartment building and a demolition of a building. In the reconstruction project, on Kustgatan in Gothenburg, furnishings in common areas were 100% reused and fixed fixtures, toilets, etc. in the common areas were 50% reused. There was also an entire apartment refurbished where all visible components are reused.
- Karin Hedén works as a Sustainability Coordinator at White Arkitekter. Karin assists in setting sustainability requirements and aims in projects, which she then follows up on. She has also acted as a reuse consultant in several projects, for example, Chalmers Fastigheter's reuse project Onsala Rymdrum and Vasakronan's demolition project Kromet.
- Lotta Zachrisson works as an environmental specialist at the contractor firm Peab in the construction business area. Her expertise area is resource efficiency and circularity and works with strategic development of environmental work across the entire company. Lotta is not involved directly in any specific projects but supports the company at a more strategic level and helps with formulations in tenders.

## 4.2 Factors that Affect Reuse in Procurement

Today, there are few projects that have a strong reuse focus. Few clients have experience in writing procurements that includes reuse and there are not many contractors that have worked with the construction of reuse projects or have left

tenders that include reuse. For reuse to be standardised, first of all, clients and governing organisations need to start to put visions and requirements on reuse in the construction sector in order for contractors to start producing it. Contractors themselves find it difficult to drive the reuse development alone. They can make small differences in how they manage materials on the production site and work with minimising waste from building materials. But they can not implement reuse in the design of the building if they are not involved in the design phase (Zachrisson).

Many of the respondents point out the importance of starting small as a step for reuse to be more widely implemented in the construction sector. By starting to reuse a few toilets and indoor doors or just reuse waste timber in outdoor areas like terraces or gardening pots, a working routine has been started to develop. Another way is to start having the courage to formulate a vision of reusing one product in each construction category or requiring consultants to have an interest in reuse, small steps have been taken towards implementing reuse in the majority of future construction projects.

### 4.2.1 Contract Form

In most of the projects where the respondents have been involved, the form of contracting has been Design and Build. This form of contract is held to be beneficial since the same contractor is involved from start to finish in the project. This contract form requires a lot of pre-work and very clear requirements from the start, to make sure there are no loopholes in the procurement that lead to extra costs (Hornö Eriksen). A Construction contract, which means that the design phase is separated from the production phase, can lead to disagreements which may result in additional costs for the client.

Regardless of the form of the contract, it is important to specify the project's visions and goals in the procurement. It should for example be clear what the tenderers should include in the calculations and what the evaluation criteria are. Many of the respondents stated that it is important to start with reuse early on in the project since it can be difficult to make changes later on. It is therefore crucial to include reuse in the procurement since it forms the basis for how the rest of the project proceeds, according to the respondents.

> ***"If you work in partnering, you have the opportunity to continuously make changes and look at the cost effect of it. This means that you can come in very late in the project and start looking at the possibility of reuse."***
>
> **- Anna Bernstad, Malmö stad**

Most of the respondents, both clients, consultants, and contractors, mentioned that partnering is beneficial regardless of contract form as changes can be made along the course of the project without risking additional costs for the client. Furthermore, partnering is also advantageous due to its flexibility when striving to use more reused materials and products, as it can be difficult to know what materials are available at an early stage of the project. Partnering also helps cooperation between the

client and the contractor, which has been seen as a must for the success of a reuse project. If working in partnering, the opportunity to continuously make changes and look at the cost-effectiveness of it and manage it over time is possible. This means that the client can come in very late in the project and say that they want to start looking at the possibility of reuse when working in partnering. Something that is difficult when not working in partnering. Moreover, partnering requires an active and knowledgeable client who follows the project over time to avoid excessive costs (Hornö Eriksen).

### 4.2.2 Public and Private Procurement

The respondents stated that there is a difference between public and private procurement, and some express a significant difference between them (Andersson, Bernstad, Dahlstrand). A private actor has more freedom if they want to work with reuse and can choose freer who they want to collaborate with. In private procurement, it is possible to have a dialogue with different companies before the procurement is set and discuss what it should include, something that is not possible in public procurement (Kaminsky). Private procurement is experienced as easier by the respondents as public procurement has several rules and legislations like LOU that need to be followed.

The interview study showed that a public actor can be criticised for decisions that can harm competition in a procurement process. Public actors need to be clearer and more transparent in their procurement and there are requirements on an evaluation process where you can explain to contractors how tenders have been evaluated (Dahlstrand). It should be easier to require reuse in procurement as a private actor, but despite this, no signs have been seen that private actors would work more with reuse than public actors (Årling).

### 4.2.3 The Procurement Process

The main factor of success according to all respondents is to include requirements on reuse in the procurement and to do so at an early stage. This is so that the architect can design and construct with the possibility of reused materials, for the consultants to plan their work and have the right knowledge, and for the contractor and client to find the right reused materials. All respondents describe that procurement is the most important factor for the implementation of reuse to succeed but that there is not enough knowledge or experience in working with it.

> ***"Procurement has made all the difference, clearly the single most important factor. Both in general to really get reuse into the projects but also to get the contractor on board."***
>
> **- Josephina Wilson, Familjebostäder**

The respondents point out that it is possible to put requirements on reuse in procurement. Several interviewees say that knowledge, competence, and interest of reuse can be required for the contractor and consultants. Since the amount of finished

reuse projects today are few, it can be difficult to demand several years of practical experience of reuse. Instead, the procurement can focus on requirements of working processes and routines that promote reuse and consultants and contractors that are dedicated to working with reuse.

Many respondents highlighted the importance of starting to put requirements on reuse, even if the demands are small. Examples of requirements to start with are to work with waste minimisation and to make use of misordered products (Bernstad). Technical consultants have in general worked more with reuse than contractors so according to Årling, it can be easier to demand knowledge and experience in reuse from them.

In the procurement process, it is important as a client to be distinct and clear in the procurement documents and to engage in the whole procurement process according to Årling. By specifying clearly what the goal of the project is, how to work with reuse, what the general sustainability goals are, and what the budget for reuse is, the chances of a successful project are greater. Årling also states the importance of encouraging innovation in procurement so that new working methods can be developed over the project's time.

> ***"The most important aspect is that the client has a clear vision and has the strength to stick to that vision."***
>
> **- Karin Hedén, White Arkitekter**

In contrast to Årling, several actors believe that it is difficult to know how specific the reuse requirements should be in the procurement. There is a fear among the clients that no tenders will be received if the requirements are too strict. One barrier is that if the client is too unclear or tough in their requirements, contractors may not have the courage to respond. If the requirements state a specific reused material, Bernstad and Zachrisson fear that this may lead to a stop in production if the specific reused material is not available on the market at that time. Therefore the contractors prefer rather vision-based requirements rather than material-specific ones. If material-specific requirements are set, the contractor prefers the client to either provide the reused material or have a plan for where it can be collected.

> ***"The difficulties are that we as clients want to set high requirements but still want contractors to submit tenders. We are generally a bit afraid that contractors will think that the requirements are too narrow."***
>
> **- Josephina Wilson, Familjebostäder**

Today, the reuse market is a bit unstable and it can therefore be hard to demand a specific percentage of reused material since it is hard to know what material will be available when needed. By establishing the basis for the procurement on a material inventory of reused material, it can be easier to implement reuse since the material is available from the start according to Wilson. Dahlstrand agrees with this and says that a material inventory is a good start, but if you only demand to reuse material from a specific list, it can be hard for the contractor to take additional initiatives

in reusing other materials. Andersson has seen several examples of requirements of reuse, both direct goals on a percentage of reuse, in weight or number of products. To start easily, it is also possible to demand one reused product per general material category. It is also possible to base the procurement tender on total CO2 emission, which the project Onsala Rymdrum is an example of. In this project, the procurement has been based on the total CO2 emission of the building, and not on the total cost which is the traditional way of evaluating tenders. In this project, the reused materials were calculated as zero CO2 emission, which made reused materials highly prioritised in order to achieve the general emission goal.

All respondents that have experience with reuse in procurement, describe that they place the requirements in the AMA AF documents. Årling describes that the AMA AF is quite long and includes many areas. Therefore it is important that early under the overview information describe what the project's reuse goals are and under what headings the reuse requirements are placed. It is also possible to include several appendixes that describe the intended reuse process, material inventories, and specific environmental goals.

### 4.2.4 Incentives, Laws and Regulations

The respondents differ in their answers regarding whether laws and regulations hinder reuse in procurement. Bernstad and Hedén describe the law about public procurement, LOU, as a challenge. The law is supposed to help and make procurement easier and to avoid corruption but can be seen as hindering since actors are afraid of doing things wrong (Bernstad). Hedén highlights the complexity of LOU and how it hinders actors from giving away used materials or products as they like. Not being able to donate material after demolition is a problem and she wishes for clearer guidelines around this.

Boverket's building regulations, BBR, are also mentioned as a hindrance (Dahlstrand and Hornö Eriksen). The regulations do not support reuse and circularity since they are based on new products. One opinion is that BBR only focuses on new production and that all products need to be CE-marked (Dahlstrand). Today, it is complex for organisations to work with reuse, which is why the reuse market is more expanded through private persons. This since they are not affected by the legislation which according to Hornö Eriksen is not up to date. The legislation must be adapted to enable more reuse, as it does not keep up with the development of the sector.

> ***"The legislation must be adapted to allow for easier implementation of reuse."***
>
> **- Cecilia Hornö Eriksen, Mölndal stad**

Building permits can also be a hindrance to reuse according to Hedén and Kaminsky. Especially if the municipality is not flexible with colour or material specifications since reused materials usually delivers later in the project and changes might need to be made in the design. However, the respondents have not heard of any case where the building permit did not go through due to reuse, but it could be a problem if municipalities are not cooperative.

In contrast, three of the respondents do not see any laws or regulations as hindering (Andersson, Kaminsky, Årling). They all claim that it rather is a perceived hinder than an actual hinder. Many public actors feel hindered by the laws such as LOU but that is held as a misconception (Årling). It is possible as a public actor to add bonuses and penalties, evaluate tenders based on CO2 emissions and talk with contractors before writing the procurement, as long as it is fair and transparent. Since actors experience that laws and regulations are hindering them, even if they do not do so in practice, it becomes a hindrance if it stops organisations to work with reuse (Andersson). There is therefore a need to clarify the laws since neither BBR och PBL describes how to work with reused materials in practice. The respondents mean that Boverket should step in and help the actors to work with reuse in procurement and to clarify the laws so that not all actors need to get stuck on the same hinder.

Laws and regulations are a crucial factor in making circular procurement a standard practice, according to Hornö Eriksen and Kaminsky. The legislation serves as the governing framework and there must be consequences in the legislation for what happens if what has been decided is not followed (Hornö Erisken). It is therefore also important to have a follow-up after the completion of the project to check whether what was required has been done. One factor that could contribute to more requirements for reuse could be if climate declarations, which report the climate impacts of a new building, were to contain more binding limit values. (Kaminsky). At present, climate declarations are only required for new production and not for renovation projects and there is no limit value on the total climate impact. In 2027, Boverket will set stricter limit values, which according to Kaminsky will be a game changer in the sector.

Incentives to work with reuse are also mentioned by the respondents as a factor of success. Both by economic support from the government to have the possibility to do structured follow-ups and also to motivate and inspire contractors to work with reuse. The importance of being aware of the extra time reuse takes and that this needs to be specified in the procurement is highlighted in the interviews. A material mark-up is also important for contractors to see the reuse of building materials and products as profitable (Kaminsky). But mostly, it is important to be flexible and collaborative between client and contractor and to have a dialogue about the requirements of reuse along both the procurement process and the construction time.

### 4.2.5 Quality and Guarantee

Many of the respondents see guarantee as an issue when it comes to reused materials and products. The reason for this is that there are no guarantees for most of the reused materials and products on the market today which puts the client and contractor in a hard position about risk taking. Some of the respondents mention that there is currently only one supplier on the market that provides quality assessment and guarantee for building materials, and that is on bricks. The respondents mean there is a need for more similar suppliers for other materials and products that provide the same service. Today, there is no sufficient market for reused materials

and products and there are still several missing segments for reuse to work, such as upgrading reused materials and products where guarantees are also provided.

> ***"The guarantee issue is a major problem that needs to be addressed in the procurement process. The industry needs to find a business model for this."***
>
> **- Jonas Dahlstrand, Projektutsikter**

The lack of guarantees on reused materials and products is a misperceived issue in the construction sector according to Andersson. Many clients often get stuck in this issue before they even start their first reuse project. Dahlstrand opposes Andersson's saying about guarantees not being a problem and says that the guarantee questions are the biggest challenge for reuse to happen, and it needs to be specified who takes the responsibility for reused products and the market needs to develop and start quality-assuring products.

Some of the respondents say that they have only required guarantees on the workmanship and assembly, and not on the product itself. Bernstad has for example been involved in projects where they in the Administrative Instructions (AF) included that there are no product guarantees on reused materials, but that there should be installation guarantees. To ensure the quality of the reused material, a quality assessment of the product can be made by the client and contractor before inserting it into the construction (Bernstad). In cases where reused products do not have a guarantee, the client can assume the guarantee on the material or product themselves. Traditionally, the client often leaves the guarantee issue to the contractor, but in the case of reuse, not many contractors want to provide a guarantee on reused materials and products. This since there is not enough knowledge and experience in evaluating the quality of reused products. If the client assumed the risk of the material, more contractors would be interested in working with reused materials.

There is a difference in guarantee depending on the type of reused material or product. It is easier to ignore a guarantee on for example a reused toilet than a reused structural component. This since the effect of a non-functioning structural element will be significantly larger than on a toilet which easier can be replaced. Furthermore, some clients are worried about what can happen if you do not require guarantees on reused materials and products (Kaminsky). A client may have a specific requirement on for example sound classification, but in a case like this, it is important as a contractor or consultant to have a dialogue with the client about if they need to have this classification everywhere or if there can be some exceptions.

The requirement for guarantees on reused materials and products can be viewed as an obstacle in the construction sector. Today there is no law about having guarantees on all products, but usually, the client wants it as security (Årling). In the case of reused materials, it can be difficult to provide guarantees because it is hard to know the materials' specifications and characteristics. Especially if there is a lack of information about fire and sound requirements or the material composition.

This could be solved, according to Årling, by not having to request environmental declarations for reused materials.

### 4.2.6 Time and Economy

A common view from the respondents is that a project that includes reuse takes extra time and costs more than a traditional project. To plan and work with reuse and find both the right materials and the right knowledge is a process that takes time. Besides this, it takes double the time to write a circular procurement compared to a traditional one, especially the first time (Årling). Therefore, it is important to add extra time to the budget for writing new procurement plans. It is also important to specify the cost for extra working hours in the procurement for a gentle demolition, finding and managing reused material, and to include it in the design.

Today, new building materials and products are cheaper than reused ones which makes it hard to motivate the use of reused materials and products. In order for reuse to be a more natural part of procurement, reused products need to be cheaper than newly produced ones. Both Wilson and Hornö Eriksen call the recent turbulent time with a pandemic and a war as positive for reuse. Increased material costs and longer delivery times have been positive for the reuse industry since companies need to rethink their working process and understand that there is a lot to win in making projects more energy-efficient, renovating, and including reused products.

One major issue, that all respondents agree on, is that monitoring and follow-up reuse requirements from the procurement are a difficult phase. Follow-up is challenging and time is a crucial factor in this. All public organisations are in general bad at follow-up the requirements set in the procurement due to a lack of resources, time, and money (Årling). Companies spend a lot of money on writing the requirements but follow-up is lowly prioritised, despite the fact that is a very important part of the project.

> ***"Follow-up is important for success. Several studies show this when we have interviewed construction actors."***
>
> **- Johanna Andersson, Svenska Miljöinstitutet**

By monitoring and following up on the requirements that are set in the procurement, money can be saved in the way that both mistakes and positive outcomes can be highlighted and the experience and knowledge can be transferred to future projects. Dahlstrand and Kaminsky describe how they have received economic support for their projects to follow-up and write a report about the final result. However, this is rather unusual, and without financial support from the government, the reports would not be written since no one would pay the money for the work. But the follow-up does not have to include an expensive report. Kaminsky describes how they both have been involved in projects that have got support to do an elaborated final report but also in projects where the follow-up has been conducted in an easier and cheaper way just by discussing it at the final meeting and summarising it briefly.

### 4.2.7 Knowledge and Attitude

In general, the respondents express great difficulties in formulating and working with procurement connected to reuse. Many believe that it is hard to know in what documents and where the requirements can be set and what requirements are possible to demand in a procurement. Dahlstrand and Årling do not express formulating procurement as a barrier but state that this is due to long experience and education in the subject. A key to a successful procurement according to Årling is not to make the formulation too complicated, it is important not to overdo it and make the procurement too complex.

> ***"I think the whole sector is a bit uncertain about procurement. We need clear examples of how to formulate the requirements and where to place them. "***
>
> **- Karin Hedén, White Arkitekter**

A reason why the knowledge and experience level of reuse in procurement is low is the lack of great examples to follow. Andersson and Hedén among others wish for clear examples of well-written requirements as an inspiration and guide to follow, something that would make it easier to start expressing demands on reuse in procurement. Andersson means that no one takes responsibility for this, as there is a lack of time and money. The needed knowledge development can be achieved through cooperation and knowledge exchange in the sector. Several of the respondents mention networks like CCbuild as a great way to get more knowledge and exchange experiences about reuse with others. There is also the possibility to purchase consultancy and guidance from others if the knowledge level is still too low in the organisation but the desire to start with reuse is still high according to Årling.

The construction sector's attitude towards reuse is in general positive and many actors want to work with it but expresses difficulties in starting. There is a large interest in reuse but if it gets too complicated or expensive, actors back off (Hedén). Zachrisson says that as a contractor they would like to have more reuse projects so that they can build up their knowledge. She believes that it is an important experience for them to be able to establish themselves more in this project area in the future.

For the sector to move forward with reuse, actors need to share their knowledge and experiences, both good and bad ones. Andersson and Wilson highlight this as especially crucial as well as the importance to dare to try and daring to fail with formulating requirements of reuse in procurement. Årling clarifies that if a procurement is too specific or strict so no actors leave tenders, it is easy to rewrite the procurement and it will not cost anything but time.

For reuse projects to succeed, it is important that the vision and goals of the projects are spread throughout the whole organisation. This so that reuse will be taken into consideration and prioritised in all decisions taken during the project's time. Besides this, the focus on reuse needs to be anchored in the senior management

so that the right financial support will be given to the project and that a reuse focus can be established early in the design phase.

> ***"As an entrepreneur, we are completely dependent on having a client who wants to construct their building with partly reused material."***
>
> **- Lotta Zachrisson, Peab**

Other factors that the respondents highlight are the need for a client who is willing to invest in a reuse project, that has a clear vision, and the strength to stick to the goal throughout the entire project. Hedén describes that in successful projects where she has been involved, the client has been interested in reuse and saw the project as a learning process and knew that it would cost a bit more than a standardised project.

Several respondents pointed out that one of the most important aspects is to get started and create routines. It might not be successful the first time but it will be easier over time. Clear routines and implementing reuse in everyday work are a key. By creating an integrated process where all levels in the organisation are included, reuse can happen in practice and not just stay as a vision.

### 4.2.8 Communication and Collaboration

A factor of success that the respondents highlight is the importance of good communication within the project as early as possible. By establishing a clear overall goal for reuse at an early stage, the chances of success are greater. Wilson describes that if they as a client would have communicated a clearer vision of the project Kustgatan and added reuse in the procurement in the beginning, the amount of reuse would have been greater. Today, there is a lack of communication between the levels of the organisation, which hinders how the process of reuse proceeds (Hornö Eriksen). One way to solve this is by hiring a person in the project that coordinates and communicates how to work with reuse in all working processes (Hedén & Hornö Eriksen). This could be a reuse expert that has basic knowledge about all steps and that can guide the project from project idea to building management and that has experience how formulating requirements about reuse. To write a good procurement, a person with technical competencies needs to collaborate with a person with procurement experience (Årling).

> ***"It is important to involve as many people working on the project as possible at an early stage. To get everyone on board and to build a shared vision."***
>
> **- Joakim Kaminsky, Kaminsky Arkitektur**

Collaboration within the project and finding a suitable working process are important factors to success. Everything becomes easier if there is good collaboration and communication between the client and the contractor. Årling describes the importance of talking with the contractors during the tender period and highlights

that this opportunity exists, even for a public actor. By asking what requirements work and which do not, the collaboration will be easier in practice.

Clients have a crucial role when it comes to making reuse requirements more standard in procurement. Requirements will drive the reuse market forward and when not having reuse requirements in procurement, it is difficult for the market to expand (Andersson). The importance of having an interested client who has enough time and resources was also stated. Furthermore, it is important that the client communicates with suppliers, contractors, designers, etc. before the procurement to understand what goals are achievable (Årling). Bernstad believes for the sector to develop, the collaboration between client and contractor needs to be highly prioritised and required in the procurement. Dialogues can then be conducted during the project and changes in the design and planning that are positive for reuse can easier be applied.

> ***"It is important to keep a close dialogue with the designer and the contractor during the tendering process. You can request preliminary tenders and discuss them. Many people think that this is not possible but you can do more than many people think."***
>
> **- Erik Årling, Colligio**

# 5

# Result

Through the literature review and interview study, several hindrances and factors of success for reuse have been identified. The literature and the respondents are aligned on many factors that affect the implementation of reuse in projects and when to require it in procurement. Some of these hindrances and factors of success are connected to the procurement process, others to the project phase or affected by governing institutions. To provide a clear overview of the hindrances and factors of success, the factors have been shortly described in figure 5.1 and 5.2. A wider description and implementation strategies of the factors will be discussed in chapter 6.

One result from the literature review and the interview study is that the level of knowledge regarding formulating reuse requirements in procurement must be improved. A way to achieve this is by organisations sharing their procurement documents to give other actors examples and inspiration to develop their own formulations. A summary of a few procurement formulations that includes reuse is presented in table 5.1, and further formulations can be found in Appendix B.

## 5.1 Hindrances to Reuse in Procurement

The hindrances to implementing reuse in construction projects as well as including it in procurement documents are several. All actors involved in the construction sector are responsible for striving towards overcoming these hindrances in order for reuse to develop. The hindrances presented in figure 5.1 have been found to have a strong impact according to the study. The hindrances are listed thematically but then in no particular order.

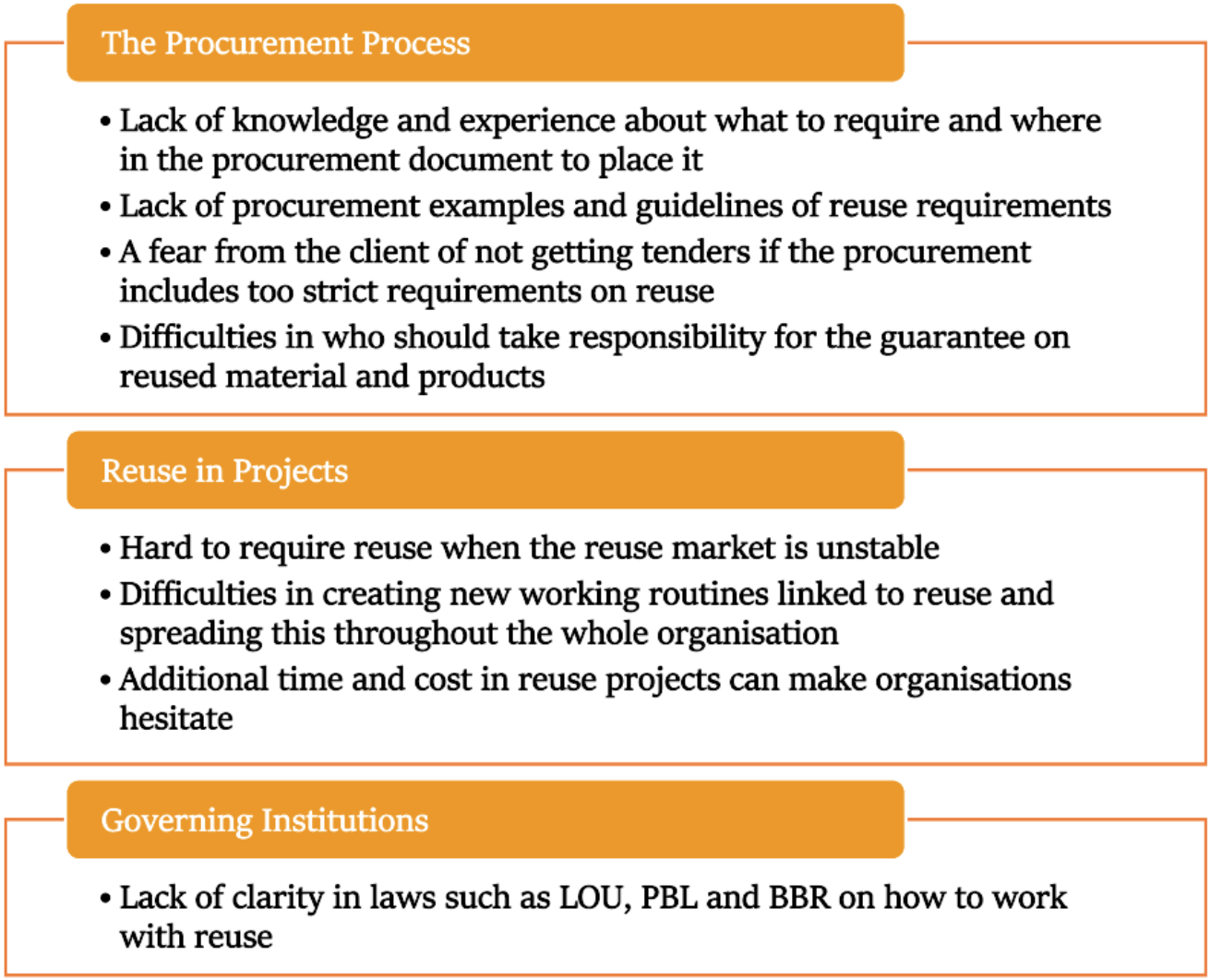


**Figure 5.1:** Summary of the identified hindrances to implement reuse of building materials and products in construction projects.

## 5.2 Factors of Success

Based on projects described by the literature and the respondents, several factors of success to reuse projects have been identified, see figure 5.2. These factors have been found crucial for the projects to succeed with their goals or learnings from less successful projects. The factors of success presented are listed thematically but then in no particular order.

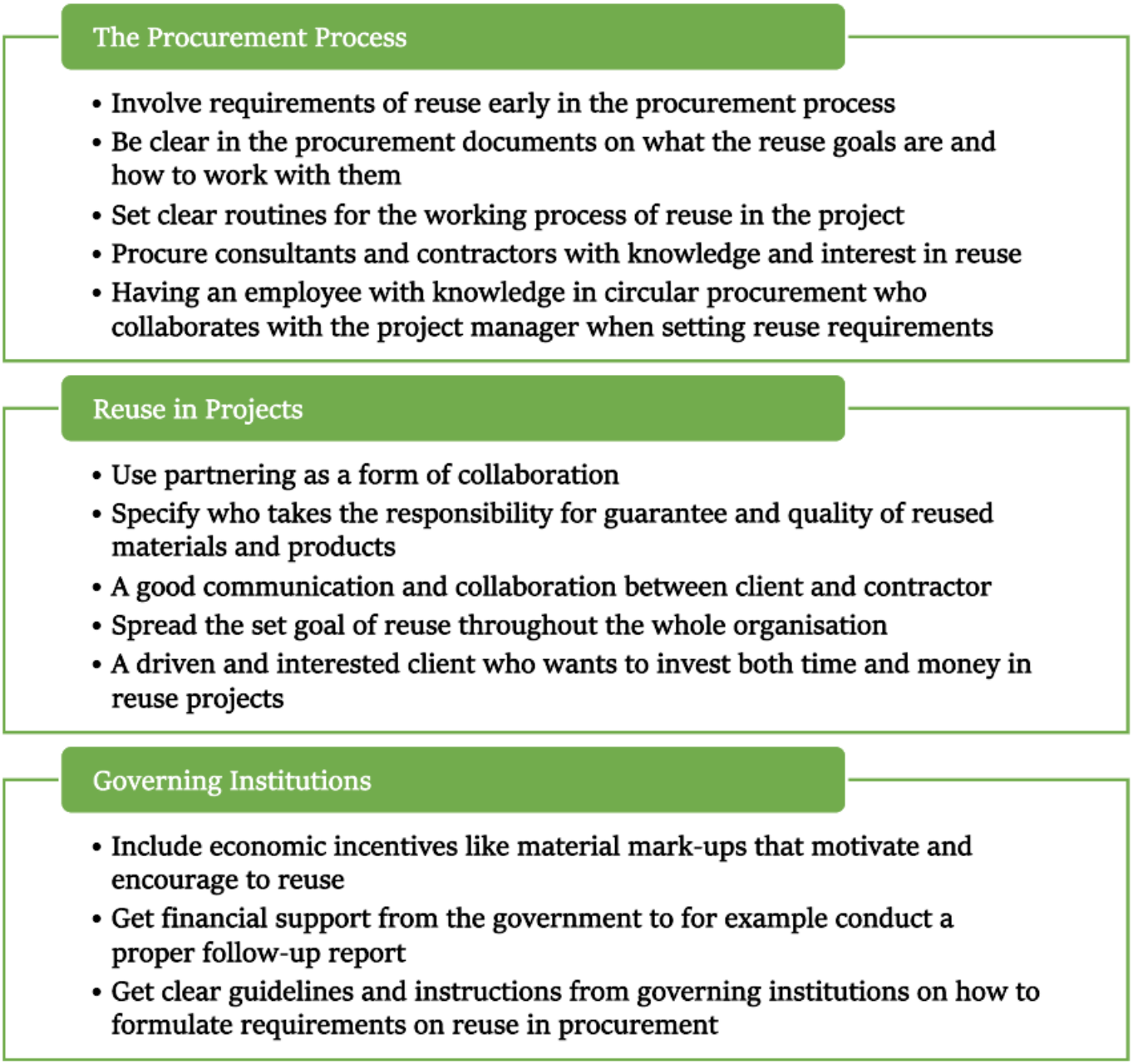


**Figure 5.2:** Summary of the identified factors of success to implement reuse of building materials and products in construction projects.

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## 5.3 Examples of Requirements in Reuse Projects

From the conducted interviews, email contact and desktop research, several examples of requirements in procurement for reuse have been compiled. Most of them are based on procurement templates based on AF (Administrativa Föreskrifter). These formulations can be used as an inspiration for actors interested in procuring more reuse in their organisation. To give a short overview on how requirements about reuse can be formulated, a few examples regarding demolition and material handling, project design and knowledge and experience are presented below in table 5.1 (Colligio, 2019; Malmö Stad, 2020). More examples, presented in their original form in Swedish, can be found in Appendix B.

**Table 5.1:** A few examples of requirements in procurement documents

| **Experience and knowledge** | | |
|---|---|---|
| **Company** | **Section** | **Formulation (Authors' translation)** |
| Malmö stad | 2.3.8 Experience | 'Bidders must have an organisation with sufficient capacity, expertise, and experience to perform the project in question. The tenderer must have carried out at least 1 reference project during the last three (3) years (counting from the last day of the tender) for a similar project. The project must have been well executed according to the client.<br><br>Proof of fulfillment of requirements:<br>Evidence 1: In order to prove that the above requirement is fulfilled, the tenderer must attach to its tender information about 1 reference project carried out in the last three (3) years (calculated from the last tender date) regarding the corresponding project. For reference projects, it must be stated who the client is, the client's contact person with contact details, a brief description of the project and how a circular approach has been applied, as well as the date of implementation of the project and the annual contract value.<br><br>Evidence 2: In the tender, the supplier must attach a CV or resume for at least one (1) employee with experience in circular economy, eco-design and circular design regarding description of the project, as well as information on 1 reference project carried out in the last three (3) years. For reference projects, it must be stated who the client is, the client's contact person with contact details, a brief description of the project and how circular economy, eco-design and circular design regarding description of the project has been applied, and the date of implementation of the project. The person does not need to have been employed by the supplier when the project was carried out.' |

| Company | Section | Formulation (Authors' translation) |
|---|---|---|
| Colligio | AFC.15 or AFD.15 Goods etc. | 'With the aim of increasing the environmental sustainability of the Client's work and contributing to a circular economy, the following applies: With an amendment to AB 04, Chapter 1, Section 9, third paragraph, the Client has the right to utilise masses, materials and goods that can be recovered during the execution of the contract. This applies to materials and goods that are not reused in the contract in question. In good time before the start of the work, the Contractor shall invite the Owner's partner, (Recycling Supplier), to inspect the [demolition] site. (Recycling Supplier) shall draw up a list of the masses, materials and goods that it wishes to make use of. The contractor shall carefully dismantle and store these masses, materials and goods on site, well protected against weather, theft and vandalism or other damage. During the contract, or as soon as possible after its completion, the contractor shall deliver these masses, materials and goods to a location specified by (Recycling supplier) within XX municipality and be responsible for unloading.<br><br>The contractor may, without compensation, use or make use of masses, materials and goods that (Recycling supplier) has not included in its list and that are used or taken out during the execution of the contract. The contractor shall arrange for the shipment to landfill of masses, materials and goods that are not recovered by (Recycling supplier) or the contractor, and costs for this shall be included in the tender.' |
| Colligio | AUC.1 or in Descriptions of tasks | 'In order to increase the environmental sustainability of the Client's work and contribute to a circular economy, the consultant shall [design/plan the works] in a way that gives the contractor flexibility in the choice of materials and products. The contractor shall be able to use suitable materials and products available on the secondary market during construction.<br><br>Option 1: The consultant shall investigate which suitable second-hand materials and products are available on the market or are expected to be available before the planned start of construction, and contact the dealer of these to reserve the materials and/or products on behalf of and in the name of the Client, and agree on quantities and prices. To satisfy the research requirement, the consultant should contact the (Recycling Supplier) or research the depot's website or other electronic means where the necessary information is available. The Consultant is encouraged to also investigate other second hand dealers. The consultant shall then [project/design/plan] for the use of the reserved materials and/or products.<br><br>Option 2: The consultant shall [engineer/design/plan] so that the contractor can use second-hand [specify material/product, e.g. toilet seats, sinks, etc.] to the extent that this is available at the time of the works.' |

# 6

# Discussion

To meet the aim of this master thesis, this chapter discusses and analyses the knowledge in reuse and procurement, as well as the hindrances and success factors when reuse requirements are included, based on figure 5.1 and 5.2. The discussion analyses important factors and topics that have emerged from the study that influence how reuse can be implemented in the construction sector. The sector's actors' knowledge and experiences are discussed and compared, as well as their possibilities to contribute to increased reuse. Furthermore, it discusses the impact of the procurement process, as well as the formulation and placement of reuse requirements.

## 6.1 The Reuse Market Today

Today, the market for reused materials and products is characterised by instability, as it is difficult to predict the availability of specific reuse products in the future. Both the literature and the respondents describe that there is no continuous flow of products which makes it hard to foresee what will be available between the design phase and the production. Since the cost of storage today is high, it is not profitable to store products for several years which affects the market negatively. Due to this, it is important for a procuring client to be conscious and not require reused products that are not available in the market (Bernstad, Zachrisson).

There are numerous reports that focus on how reuse shall be improved in practice and what hinders there are but very few connect reuse to procurement and contribute with practical examples of how procurement can affect reuse (Amrén, 2022; J. Andersson et al., 2021; Saija, n.d.). This has surprised the authors since all respondents describe how procurement has a vital role in the implementation of reuse. However, the authors have gotten the expression along the study that few actors include requirements on reuse in their procurement today. Some actors have started with pilot projects where reuse has been included in the procurement and resulted in reuse of materials and products in practice. Others have worked with reuse on a smaller scale by including reuse at a later stage of the project and not including it in the procurement. The authors believe that the big difference in actors' inclusion of reuse in procurement depends on knowledge level, interest, and financial opportunities.

A topic of significance that the authors have seen very few examples of is the inclusion of careful demolition requirements in tenders. To promote the growth of the reuse market, it is important not only to construct with reused materials but also to contribute to the reuse market by always making use of usable materials from demolition projects. Especially products that have a long remaining lifetime and that are suitable for other projects. Encouraging the use of reused materials and applying careful demolition methods, with a focus on selling these materials on the reuse market or using them internally in other projects, can promote the growth of the reuse market. By establishing a demolition plan several years in advance, municipalities can enable stakeholders to reserve appropriate products for their future needs. This proactive approach allows stakeholders to know in advance about available materials, facilitating the materials' inclusion in the design process and ensuring that the material will be available on time.

## 6.2 Different Actors' Ability to Influence

Throughout the studies, several actors have been identified as crucial for the development of reuse in the construction sector. These actors all have different possibilities and opportunities to influence the inclusion of reuse requirements in procurement, as well as the potential to increase the implementation of reuse practices.

**The client** has the most important role in setting requirements and visions about reuse in procurement. Gerhardsson et al. (2019) agrees with this and points out that the client needs to strive for reuse early in the project in order for the final result to have a significant amount of reuse. The client also has the possibility to start flagship projects with a high grade of reuse which can be an inspiration for other clients to start similar projects, something that the other actors do not have the possibility to do to the same extent (Zachrisson). Besides ordering and including requirements on reuse in the procurement, the client has the opportunity to assign responsibilities and specify how the collaboration shall work along the project.

It is the client who has the overall responsibility in starting reuse projects and that has the possibility to drive the development forward (Andersson). By clearly deciding that the project shall prioritise reuse and include this focus early in all important documents such as procurement, building permit applications, and competence recruitment, the client sets a clear direction for the rest of the project to follow. To solve the guarantee questions which is a crucial factor according to both the literature and respondents, the client can take the responsibility for the guarantee of reused materials and products from the contractor. Something that would solve many uncertainties which the contractor may have with this issue.

**The technical consultant** has the possibility to use their expert knowledge and experience from various reuse projects to help clients and contractors find solutions and get inspiration on how to effectively incorporate reuse practices in their projects (Årling). With their specific knowledge of the reuse process, a reuse consultant can work as a coordinator between different actors, help to find suiting reused material, do material inventories, and assist in formulating goals and requirements on reuse

in the procurement (Saija, 2022a). Consultants can also help with motivating and proving to clients and investors the economic and environmental savings resulting from reuse. They can provide evidence of the savings that can be achieved through reuse, showing how although it may seem initially more expensive from certain perspectives, it can lead to cost savings in other areas.

**The architect** can actively contribute to the successful implementation of reuse practices by demonstrating flexibility in their work. This means that they can integrate reused materials and products into their designs and that they can take into account new reused materials discovered during the construction process. Architects can significantly influence the final outcome by integrating and presenting proposals for reused materials during the initial design phase, while actively engaging in ongoing discussions with the client about the benefits of reuse. The respondents describe that some investors may need to be convinced that reuse is not the same as old outdated products without value, and here the architect can have a great influence in presenting modern and innovative design proposals.

**The contractor** can in their own work focus on minimising the material waste during the production phase and be cautious during demolition so that used material can be saved and reused (Zachrisson). They can also be courageous in leaving tender to reuse projects, even if it would be a new experience to for example calculate the tender based on CO2-emission or describe how to work with reuse routines along the project. While it may require additional time and expertise to prepare tenders and proposals for reuse projects, contractors can express their commitment by showing interest and submitting credible tenders. This can also encourage clients to prioritise reuse projects more and increase their focus on sustainability. Depending on the contract form, if a Design and Build contract or partnering is used, the contractor can contribute with ideas or solutions on how reuse can be implemented in the production and therefore have an impact on the design of the project.

Contractors play a crucial role in promoting the use of reused materials by pushing suppliers to increase the availability of such materials and encouraging them to collect and reconstruct their own products while providing guarantees. With their close relationships with material suppliers, contractors have the possibility to demand circular materials during the purchasing process and thereby driving a positive change towards more sustainable material sourcing practices. The authors believe that the contractors have a bigger role in driving the construction sector towards circularity than some might think and that it is important to take responsibility and act in the areas where they are operating.

The study reveals that all actors can contribute to the advancement of reuse practices by actively sharing their knowledge and experience, both internally and externally. This can be achieved through various means such as reports, follow-up meetings, and participation in networks like CCbuild or other workshops. By openly sharing both successful and unsuccessful actions, the development of reuse practices can be improved, and actors themselves can benefit from the increased knowledge and experience within the construction sector. The authors believe that the lack of

sharing examples might be due to business secrets and prestige but also cultural norms where organisations do not want to share their working methods with others.

## 6.3 The Procurement Process

Procurement forms the basis for how the project will be conducted and what the focus areas will be. Besides this, the procurement states how the distribution of responsibilities and cooperation will take place.

### 6.3.1 Type of Procurement

The respondents believe that private and public procurement differs in terms of incorporating reuse practices into a project, with varying opinions on the extent of this difference. Private procurement is seen to be easier by the respondents as it is not as controlled by different laws and regulations. Despite this, no clear pattern has been seen in whether there is more procurement in the private sector when it comes to reuse projects, something that Årling mentions in his interview. This is a conclusion which also the authors of this report have noticed and find interesting.

In public procurement, there are more laws and regulations to consider in comparison to private procurement, which both the literature study and the interview study states (Upphandlingsmyndigheten, n.d.-d). The authors have personally experienced challenges to find information on the applicable rules for private actors. It is known that public actors need to be more transparent in the procurement process and the client needs to be able to explain how the tenders have been evaluated. The lack of information about private procurement might be a sign that few regulations about their procurement process need to be followed. This might be a reason why several respondents find it easier to work with reuse projects in private procurement compare to public.

### 6.3.2 Contract Form and Partnering

The type of contract form chosen, Design and Build contract or Construction contract, determines who is responsible for the different parts of the project and the choice of contract type sets the conditions for the project. Göteborgs Stad (2020b) says that there is an equal opportunity to run innovation projects under the two different contract types, but that the actor responsible for innovation differs. Neither the literature nor the respondents show any indication that one of the two contractual forms is more favorable than the other in reuse projects. What has been shown to be important is to choose partnering as a form of cooperation to have the possibility of a flexible design process and good cooperation between the actors in the project.

Many respondents pointed out the benefits of partnering, particularly when reusing materials, as the market is unstable and it is hard to predict availability during construction. Partnering can help manage risks and costs by allowing agreements between the client and contractor to share additional expenses or profits that may

arise later in the project (Strand Nyhlin & Åfreds, 2022). Hornö Eriksen also highlights the importance of active client involvement to avoid extra costs. This has also been noted by the authors throughout the study as an important aspect. If the organisation finds that they do not have enough knowledge or experience in reuse projects, they may consider excluding partnering in their contract. Partnering requires the client to be involved in several decisions along the project which is time-consuming when the organisation lacks relevant knowledge of reuse.

## 6.4 Legal and Economic Aspects

In the study, several hindrances connected to legal and economic aspects have been found together with solutions for how to handle them. These aspects have been shown to have a great impact on the final result and it is therefore of great importance that they are considered and discussed.

### 6.4.1 Laws and Regulations

The main difference of opinion in this study is whether rules and legislation hinder reuse to develop further. Some literature and respondents agree that rules and legislation like BBR and LOU are a perceived barrier and that it should not be harder to conduct a reuse project as a public actor (Saija, 2022a). The authors can understand why these actors do not see laws and regulations as a hinder, especially in theory, since they have a lot of education and experience and work as experts in different forms. This is a sign that over time and with increased experience, circular procurement is perceived as progressively easier to implement.

What is interesting though is that despite laws and regulations might not be a hindrance in theory, several actors find it a hinder in practice. The study has identified how LOU can be perceived as hindering the opportunity for public actors to donate or sell reused material as well as receive it for free. The authors have also heard about this problem in other contexts and can see that the laws are hard to understand and a clarification from the government is needed. Some public actors have succeeded in selling and receiving reused materials and products but it should not take a group of experts and several working days to solve it. If it takes so much extra time to work with reuse, actors do not see it as profitable and the step to start with reuse is longer.

### 6.4.2 Lack of Guidelines

Both the literature and several respondents argue that governmental organisations are lacking clear guidelines for reuse. All publications are based on new production and there are barely any writings on how to be sustainable without using any new products. Kaminsky mentions that the limits for total climate impact on construction projects today are vague but hopes that with the stricter guidelines starting in 2027, implementation of reuse will be a way to reach the targets. What Lindeberg & Ryding (2020) mention in chapter 2.6.2, that circularity and reuse are barely

mentioned in the public procurement law, is surprising the year 2023. It is another example of how the Swedish government has a lot to work on to make it easier for companies in the transition from a linear to a circular material flow. Both Hornö Eriksen and Kaminsky mean that it is pressure from the state that makes the development move forward. The authors have recognised that this factor is crucial in motivating clients to prioritise reuse in their projects and establish it as a standardised process. Government policies should not hinder and prevent the development of reuse.

A reason why the desired financial support and the guidelines might be missing is that the issue has a low priority and again a lack of knowledge in the subject. The construction sector needs to highlight the issue and show the importance of how it would affect the sector. The business community has an important role in spreading information about the subject to governing institutions and over time the issue will be higher prioritised.

### 6.4.3 Guarantees

Guarantees on reused materials and products are lacking in today's market. Taken from the literature and the interviews, the authors find that there is a fear of not knowing the remaining lifespan and content specifications of the reused material and products. According to Wennesjö et al. (2021) a development in the market where more actors provide quality assurance and guarantees for reused materials and products is needed for the implementation of reuse in projects to become more established. Many of the respondents who have been involved in reuse projects agree with this and consider the question about the lack of guarantee on reused materials and products as an obstacle.

The authors have perceived the guarantee issue as a hinder by several respondents as well as the literature. The solution to the problem is relatively simple if the client has the courage to take the guarantee on the reused materials from the contractor and only demand a guarantee on the installment of the products. For this to function well, the client needs to be present at the construction site when reuse material choices are made to make sure that it meets the quality requirements. Otherwise, low-quality products might be installed which can lead to an increased cost for the client at a later stage. To avoid conflicts about the reused material, the contractor needs to be gentle with the material even if they are not responsible for the material guarantee. The exact division of the guarantee aspect needs to be clearly defined in the procurement.

Another possibility to make the guarantee question easier to handle is if the material suppliers would retake their products, renovate and quality assure them and give a guarantee on the reused products. This would lower the risk for the client and the contractor and would be positive for the reuse market, just like the market for reused bricks has increased.

### 6.4.4 Follow-Up and Economic Incentives

Follow-up is a tool that creates opportunities to reflect and learn from both mistakes and factors of success. Despite this, both the literature and the respondents indicate that this is a low-prioritised area that most organisations could be better at, something the authors find surprising. The respondents describe that follow-up of requirements set in the procurement is mainly seen as hindering as it cost money and takes extra time and is therefore not prioritised at the end of a project. Årling mentions however that clients spend a lot of money in formulating the requirements and preparing the procurement and that it is interesting why no money is reserved for monitoring and follow-up if the requirements have been completed. Colligio (2019) describes that it is possible to add bonuses and penalties in procurement as a motivation to work harder towards reaching set goals. If this is included, then it is even more important to do a follow-up to see if money shall be paid or refunded. Follow-up is also a way to contribute to the development of the sector and to encourage innovation if the results are published, something that the construction sector is in need of. Again, the economic aspect as well as time are crucial factors just like other areas. The study shows that economic incentives are needed for follow-up to be prioritised. Today, the issue of follow-up and report writing is not prioritised at the final stage of a project due to a lack of time and money. But if follow-up is budgeted early and support is given, it has been shown that it is implemented.

Another incentive to motivate contractors to work with reuse is material mark-ups for reused materials and products (Saija, 2022b). This since the contractor can earn money from reused material in the same way as they do when they buy new materials. There are a lot of discussions about the need for financial incentives, but today neither the companies nor the authorities seem to have the opportunity or the priority to pay to a greater extent. The authors have seen wishes to include material mark-ups on reused materials as a way to motivate contractors to work with reuse. But interestingly, no practical examples have been seen of projects that have used material-mark-up as an incentive. Neither has demands on material-mark ups been mentioned by contractors as a must to work with reuse. A few examples of formulations that can be used in procurement regarding material mark-up can be found in Appendix B.1, page VIII.

## 6.5 Knowledge and Experience

Right now, the reuse development is driven by enthusiasts with great knowledge and interest in reuse. If these individuals are not involved early in the project, it is a big risk that the reuse focus will not be included in the procurement, both regarding the project as a whole and procuring consultants and contractors. This is mainly the client's responsibility as they define the standard of the project at an early stage. An inexperienced client might see more hindrances to reuse, like cost and time, rather than possibilities. They might also have issues when formulating requirements, which affects the whole procurement process. To solve this, examples

and guidelines from the government needs to be published as well as experience exchange within the sector (Lindeberg & Ryding, 2020).

It can clearly be seen in the study that the actors have different knowledge and experience in reuse and this leads to different opinions about laws and regulations as well as guarantee differences. It seems not to be enough that experts, enthusiasts, and well-experienced actors have theoretical knowledge of how to work with reuse. There is a need for an increase in knowledge at all levels of the organisations, both for economists, procurers, supervisors, and production professionals. It is crucial that this knowledge is not only at a theoretical level but most important on a practical one. Without commitment and interest from all actors, it will be hard to succeed with the implementation of reuse since the experts will not be present where all decisions are taken. By educating all employees in basic knowledge on reuse and giving special education in for example circular procurement, gentle demolition, and material inventories to relevant actors, the reuse market can develop. Also, when increasing the knowledge and showing that even if reuse might be more expensive in some areas, money can be saved in other parts, clients can be motivated to invest more time and money in reuse projects.

Besides this, actors need to be brave and collaborative in sharing their knowledge of reuse with others, especially about how to formulate requirements of reuse and give feedback on how it affected the result. Surprisingly, most actors have described how they want this information from others but find it hard to share the information about their own procurement process.

## 6.6 What Requirements Can Be Set?

Both the literature and the respondents describe that in order for reuse to be implemented in a project, it needs to be included in the procurement at an early stage and that extra time is needed when working with reuse and to write the procurement. Gerhardsson et al. (2019) describes that it is possible to set requirements on experience of reuse project, but the respondents are doubtful about that since the development of reuse in the construction sector has not reached that far. To set requirements on knowledge and interest is a better way to go right know even if experience is desirable. This is both because actors may not have so much experience but also because it can be hard to value what experience is better than another. However, the authors may consider that knowledge and interest are also factors that can be difficult to balance and that an overall approach is in many cases the best approach. Examples of formulations regarding knowledge and experience can be found in Appendix B.1, page IX.

It might not be suitable to put requirements on a specific percentage of reused material (Saija, 2022a). With today's reuse market conditions, it can be difficult to know what materials that will be available in the future. But by requiring a high amount of reused products, the study has shown that the result becomes higher than those who have not put so high requirements. To solve Bernstads and Zachrissons concerns about too specific requirements on materials can lead to stops in production,

the requirements can rather be formulated as visions and the procurement includes a formulation of an end-date where the search for reused materials needs to stop. If no reused materials have been found until this time, they are allowed to be replaced with new products. However, it is important to specify who has the responsibility of finding reused products and maybe include a bonus for all usable reused products found.

As seen in chapter 4.2.3, there are differences of opinion among the respondents regarding how specific requirements in the procurement shall be. Årling states that formulations shall be distinct and clear while other actors are afraid of requirements being too specific. Årling has with his expertise as a procurement consultant a lot of experience in writing requirements in procurement and has a lot of theoretical knowledge on what requirements can be set. The authors agree with Årling in the way that formulations shall be clear in the way that they shall not be misunderstood or not being misleading to the purpose of the project. The authors also understand the fear from other respondents who has a lack of experience in writing requirements and therefore are afraid of what the outcome will be of too specific reuse requirements. Again, the courage to start writing circular procurement and share knowledge with others will make this hindrance manageable over time.

Just like Dahlstrand describes, the client and procurer must adapt to the current market. Even if the ambition is higher, the sector's knowledge and condition will eventually determine the final outcome. As mentioned by both the literature and the respondents, a net-list based on a material inventory can be an easy way for organisations to start with reuse (Saija, 2022a). However, the authors can see limitations with this as it might be hard to reach a higher amount of reused products than the net-list, especially if the possibility to use other products is limited in the procurement.

## 6.7 In What Documents Should the Requirements Be Placed?

All research indicates that it is in the AF (Allmäna Föreskrifter) that requirements on reuse shall be set (Colligio, n.d.-b). At the same time, several respondents mention that it is hard to know where they shall be placed. The authors see the AF as a long and complex document and it is hard to know where you can be confident to do changes without it affecting other parts of the contract. With this said, it demands some knowledge and experience to know in what chapters changes can be made. Some respondents say that it is not enough to refer to the fact that the requirements are to be set in the AF, it also needs to be specified more clearly in which chapters and paragraphs the requirements are to be set. Årling also describes how it is important to place descriptions of the reuse work early in the document and refer to where in the document it is mentioned so that readers know that changes have been made and that it is not just a traditional procurement document.

A few respondents mentioned the possibility to include appendices to the procurement that describes how the work process of reuse can be handled. Neither the literature nor the respondents describe this in detail. Again, there is a lack of clear guidelines on how to include reuse in procurement. Both how to formulate requirements and also clearly in what documents they shall be placed. The authors agree with the respondents and the literature as they have found it difficult to find good examples of well-written requirements that have been used in practice and rarely any guidelines from governing organisations on how procurement can be used as a tool in the development of reuse.

The summary available in appendix B.1 has required a thorough and time-consuming investigation from the authors and many attempts to personal contact with organisations to share their formulations. The authors understand it is hard for other actors to have time for a similar investigation and just like Andersson highlights, governmental organisations ought to spend time compiling examples and publishing clear instructions. In addition to this, actors must be willing to share their experience and examples of procurement documents that they have used. The authors believe that the reason for the lack of sharing either can be due to a shortage of time or competition between companies. Hopefully, it is rather due to cultural circumstances and old habits that will change for the better over time.

# 7

# Conclusion

The work of this master thesis has revealed how procurement and reuse are connected and what impact it can have on the project's result and on the development of the sector. It has been surprising for us how few projects actually include requirements of reuse in practice today, despite the great interest in the subject. The many perceived hindrances have also been unexpected as well as how few solutions to the problems that are developed and used.

We understand why actors express difficulties in finding guidelines and information on how to implement requirements of reuse in practice as our study confirms that information are short-handed. The main conclusion besides how effective procurement is to the implementation of reuse, is that the knowledge level about reuse in procurement needs to be improved at all levels of the organisations for new working methods to be established. Courage, time and experience are important factors for reuse to develop and the sector's actors together with the governing institutions need to work towards implementing new guidelines.

The following conclusions answer the research questions and are based on the results from the literature and interview study. This report's conclusion as well as the summary of formulations in procurement is one step towards helping the construction sector to move towards circularity. More research needs to be conducted within the area to increase the knowledge level in the sector. This will be discussed further in chapter 7.1.

- **How can requirements in circular procurement increase the implementation of reused building materials and products?**

First and foremost, procurement has been shown to have the most important impact on the implementation of reused materials and products in the construction sector. Without specified requirements on reuse in procurement, great investments in reuse projects rarely happen and the project process is often surrounded by problems and misunderstandings. When reuse is included in the procurement and early in the project, the result is not depending on enthusiasts but on the whole organisation.

By requiring knowledge and to some extent experience on reuse from consultants and contractors in the procurement, the general knowledge within the project will increase and reuse will be taken into account in more decisions.

The level of reuse can also be increased by requiring a certain amount of reused materials and products or referring to a specific material inventory list. This will lead to a change where newly produced products will be replaced with reused ones.

- **What are the main barriers/challenges to reuse linked to requirements and procurement?**

The lack of knowledge in the sector and particularly the lack of practical experience of reuse projects prevents reuse from being included in procurement. There is a need for increased education on how organisations can include reuse in their procurements and how to formulate suitable requirements that are adapted to the current market. Currently, there is a great lack of information, guidelines and examples of formulations of reuse requirements in procurement, something that not only governing institutions must develop but also actors must contribute by sharing their experiences and writings. There is also an uncertainty in several laws such as LOU, PBL, and BBR that the government and authorities need to clarify and adapt to the current circular market to simplify the work on reuse.

Another barrier to reuse is the insufficient reuse market and the uncertainty about the availability of materials in the future. The instability creates insecurity among actors about what requirements can be set in procurement. Also, the lack of quality-labeled and guaranteed reuse products makes actors uncertain. More material suppliers should guarantee reused products and clients should assume the risk of reused products from the contractor as a way to overcome these hindrances.

- **What are the main factors for a successful circular procurement with a focus on reuse?**

It is essential that reuse is included early in the project and therefore also early in the procurement process. The organisation and client must be willing to work with reuse and must have clear working routines, financial resources, and the will to invest in reuse. The requirements need to be clearly formulated to avoid misunderstandings and include descriptions of the project's reuse objectives. It is necessary to have a knowledgeable procurer who collaborates with a technically experienced employee who together formulates the requirements linked to reuse.

To succeed, close cooperation between all actors and a continuous dialogue throughout the project between client and contractor is essential. Good knowledge of reuse is vital among the actors, especially those who formulate the reuse requirements. Financial incentives and support that motivates reuse projects have also proven to be positive for projects that include reuse and the development of the sector.

- **What is needed to make reuse a natural part of procurement in the construction sector?**

The construction sector needs to find a way to solve the barriers such as guarantee issues, lack of knowledge, and uncertainty about laws and regulations. It is necessary to find an effective working method not only for pilot projects, but the knowledge about reuse requirements needs to be spread throughout the organisation, both

production workers, procurers, and investors. By evaluating projects, spreading knowledge and experience of good and less good procurements, the sector develops further. As a first step towards circularity, it requires courage and interest from the client to invest time and money in reuse projects and to dare to include various requirements linked to reuse in their procurements. For reuse to be implemented in more projects, economic incentives are needed. With increased pressure from the government regarding circular material flows and lower CO2 emissions, clients will be forced to include more reuse in their projects and need to set requirements for material suppliers, consultants, and contractors to engage in reuse. Besides this, it must be easier to work with reuse and guidelines and work routines needs to be established in order to reduce the extra time spent on reuse projects. The reuse market also needs to develop and the price for reused material and products needs to be lower to make reuse more profitable compare to new products.

## 7.1 Future Research and Development

What has been identified from this study is that the sector is still in the initial stages of working in a more controlled and systematic way with reuse and setting requirements for it. An increased number of reuse projects and particularly follow-ups on existing projects need to be carried out for the sector to move forward in the work towards becoming more circular. The construction sector has great potential in changing from linear to circular material flow. The interest in the subject is great but a large increase in knowledge is needed for reuse to be implemented in not just pilot projects but to be spread more widely.

A potential topic for a future master's thesis could be a case study that investigates a project with formulated reuse goals included in procurement. This approach would provide a broad analysis of the project's performance over time and allow for a more in-depth analysis. The study could analyse the reuse requirements that were set in procurement and evaluate their impact on the project. Besides this, the study could explore how different actors in the project followed and managed these requirements.

Another issue that has emerged in this thesis is the uncertainty among clients about what requirements can be set regarding reuse. There is a request for examples of requirements that can be applied to projects. The authors have compiled a list of requirements from various companies and projects, but the authors believe that this is something that a person with procurement expertise should investigate further.

With the growing interest in creating a more circular construction sector, the future of reuse is promising. As environmental regulations become more strict, knowledge and awareness of reuse will continue to grow, making it a standard practice in procurement and projects. By taking risks and investing in reuse, and testing different procurement formulations and production solutions, the sector can increase the integration of reuse into its practices. This will lead to increased knowledge and more reuse projects in the future.

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# A

# Interview Guide

These questions has served as the basis throughout the interview study. The questions has been customized based on the respondents expertise area and how the conversation proceeded.

INTRODUKTIONSFRÅGOR

- Kan du presentera dig själv och din roll i organisationen?
- Vilka projekt har du arbetat med?

SYFTE OCH MÅLSÄTTNING

- I vilka projekt har du arbetat med återbruk och cirkulära kravställningar?
- Berätta om syftet med projektet. Var återbruk en del av upphandlingen ifrån start? Vem var den drivande aktören inom återbruk?
- Vilken typ av upphandling/ar gjordes och vilken typ av entreprenadform valdes? Varför valdes den specifika typen av entreprenadform?
- Vad var målsättningen inom återbruk i projektet? Hur formulerades målsättningen och vilken status hade det dokumentet?

RESULTAT

- Hur följer ni upp kravställningarna som var med i upphandlingen?
- Lyckades ni med er målsättning? Varför/varför inte?
- Vad var framgångsfaktorerna?
- Vilka var riskerna/fallgroparna?
- Om ni hade fått möjlighet att göra om projektet, vad hade ni då gjort annorlunda?
- På vilket sätt har upphandlingen gjort skillnad i graden av återbruk?

KRAVSTÄLLNINGAR OCH UPPHANDLINGAR

- Vilka kravställningar i upphandlingen var lyckade? Vilka kravställningar lyckades inte?

- Vilka är de viktigaste lärdomarna som ni tar med er?

BRANSCHENS INSTÄLLNING

- Vad har ni fått för respons på kravställning gällande återbruk?
- Vad krävs för att återbruk ska bli en mer självklar del i upphandlingen?

KRAVSTÄLLNINGAR OCH UPPHANDLINGAR

- Vilka är nyckelfaktorerna som måste kravställas inom ett projekt för att uppnå återbruk?
- Inom vilka områden har kravställningar ställts kring återbruk? Kompetens, material, leverans, lagring, projektering etc?
- Vilka områden är lättare/svårare att upphandla? Varför?
- I vilka upphandlingsdokument specificerar ni krav på återbruk?
- Hur arbetar ni med garanti i era upphandlingar?

UPPHANDLINGSKOMPETENS

- Upplever du att det är svårt att formulera kravställningarna/upphandlingarna?
- Upplever du att det är någon skillnad på privat och offentlig upphandling kopplat till återbruk?
- Upplever du att lagar och regler, och specifikt LOU är ett hinder eller inte inom upphandling som inkluderar återbruk?
- Anser du att din organisation har tillräcklig kunskap gällande upphandlingar kopplade till återbruk?
- Vart har du fått din kunskap ifrån kring upphandling?

AVSLUTANDE FRÅGOR

- Kan vi få tillgång till era upphandlingar/kravställningar som har varit kopplade till återbruk?
- Har du något exempel på ett annat lyckat återbruksprojekt? Vad anser du är framgångsfaktorerna där?
- Har du tips på någon annan intressant person som vi borde intervjua?
- Vad är det viktigaste som du tycker att vi ska ta med oss från den här intervjun?
- Har du något övrigt som du vill tillägga innan vi avslutar?

# B

# Examples of Requirements in Reuse Projects

These examples of formulations have been compiled by the authors who have contacted several actors in the construction sector and asked for formulations regarding reuse in procurement. The formulations are mainly taken from the AF documents and possible section references can be seen in the table. The formulations have been taken directly from its procurement document or through personal communication and the authors have not made any changes to the formulations. The formulations have either been found through searches on the internet or through personal communication with the responsible actor where the publication has been approved.

**Table B.1:** Examples of requirements in procurement documents

| **Kommunikation och samverkan** | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Colligio | AFC.333 Byggmöten | 'Vid byggmöten ska en agendapunkt alltid vara gälla samverkan för att hitta möjligheter till minskad miljö- och klimatpåverkan från byggnaden, samt för att öka mängden återbrukade material och produkter.' |
| Colligio | AFD.332 Projekteringsmöten | 'Entreprenören ska från kontraktstecknande till färdigställd projektering kalla Beställaren till en entimmes avstämning gällande projekteringen varannan vecka, samt ett fysiskt möte för vilket två timmar ska avsättas, varannan vecka. Fysiska möten kan på Beställarens begäran ersättas av digitalt möte. Utöver sedvanliga samverkansfrågor ska alltid en agendapunkt vara samverkan för att hitta möjligheter till minskad miljö- och klimatpåverkan från byggnaden, samt öka mängden återbrukade material och produkter.' |
| Akademiska hus | AF-mall | 'Information om vilka byggmaterial och installationer som ska demonteras för senare återmontering eller återbruk i annan fastighet ska atningen anges i teknisk beskrivning eller annan kontraktshandling. Även adress för lagerhållning eller mottagande fastighet ska anges för respektive produkt. Om Entrepreören ska stå för lagerhållning måste omfattningen vara tydlig för kalkylerbarhet.' |

| **Demontering och materialhantering** | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Colligio | AFC.15 eller AFD.15, "Varor m.m" | 'Med syfte att öka den miljömässiga hållbarheten i Beställarens arbete samt bidra till en cirkulär ekonomi gäller följande: Med ändring av AB 04 kap 1 § 9 tredje stycket gäller att Beställaren har rätt att tillgodogöra sig massor, material och varor som kan tillvaratas vid utförande av entreprenaden. Detta gäller för material och varor som inte återanvänds i den aktuella entreprenaden. Entreprenören ska i god tid innan entreprenaden påbörjas bjuda in Beställarens partner, (*Återbruksleverantör*), att besiktiga [rivnings]objektet. (*Återbruksleverantör*) ska upprätta en lista över de massor, material och varor som denne vill tillgodogöra sig. Entreprenören ska med varsamhet demontera och förvara dessa massor, material och varor på plats väl skyddad mot väder, stöld och skadegörelse eller annan åverkan. Entreprenören ska under entreprenaden, eller så snart som möjligt efter dess slutförande, leverera dessa massor, material och varor till av (*Återbruksleverantör*) på angiven plats inom XX kommun samt svara för avlastning.<br><br>Kontaktuppgifter till (*Återbruksleverantör*)<br><br>Entreprenören får utan ersättning använda eller tillgodogöra sig massor, material och varor som (*Återbruksleverantör*) inte inkluderat i sin lista och som tas tillvara eller tas ut vid utförande av entreprenaden. Entreprenören ska ombesörja forsling till deponi av massor, material och varor som inte tillvaratas av (*Återbruksleverantör*) eller entreprenören, och kostnader för detta ska ingå i anbudet.' |
| Akademiska hus | AF-mall | 'Demonteringen ska vara aktsam och planeras in i projektets tidsplan. Entreprenören ska ombesörja digital registrering av produkterna (både de som återmonteras i samma projekt och de som återbrukas på annan fastighet) i plattformen CCBuild (www.ccbuild.se), med relevant information samt transporter till plats för lagerhållning (som Beställaren tillhandahåller) eller mottagande fastigheter. Inloggningsuppgifter i systemet erhålls via Beställaren och användningen är kostnadsfri för Entreprenören.' |

| **Projektering** | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Colligio | AUC.1 alternativt i uppdragsbeskrivning | 'I syfte att öka den miljömässiga hållbarheten i Beställarens arbete samt bidra till en cirkulär ekonomi ska konsulten [projektera/planera objektet] på ett sätt som ger entreprenören flexibilitet i val av material och produkter. Entreprenören ska vid byggnation kunna använda lämpliga tillgängliga material och produkter på andrahandsmarknaden.<br><br>Alternativ 1: Konsulten ska undersöka vilka lämpliga andrahandsmaterial och -produkter som finns på marknaden eller som beräknas finnas före planerad byggstart, och kontakta återförsäljaren av dessa för att å Beställarens räkning och i Beställares namn reservera materialen och/eller produkterna, samt överenskomma om mängder och pris. För att tillfredsställa undersökningskravet ska konsulten kontakta (*Återbruksleverantör*) alternativt undersöka depåns hemsida eller annat elektroniskt hjälpmedel där nödvändig information framgår. Konsulten uppmuntras att också undersöka andra andrahandsåterförsäljare. Konsulten ska därefter [projektera/designa/planera] för bruk av det reserverade materialet och/eller produkterna.<br><br>Alternativ 2: Konsulten ska [projektera/designa/planera] så att entreprenören kan använda begagnade [ange material/produkt, t.ex. toalettstolar, handfat etc.] i den utsträckning detta finns tillgängligt vid tiden för entreprenaden.' |
| Anonymt stort privat fastighetsbolag | I ramavtal med arkitekter: 3.6 Val av material samt återbruk av material i uppdrag | 'I uppdrag rörande lokalanpassning är målet att alltid anpassa lokalen med så små förändringar som möjligt, detta för att spara tid, materialåtgång och resurser. Det är av stor vikt att de förslag för anpassning som tas fram utgår från de förutsättningar som finns i lokalen. I samtliga uppdrag ska det arbetas aktivt för att använda återbrukat material och inredning alternativt återbruka befintligt material i så stor utsträckning som möjligt. Konsulten är ansvarig för att bidra till detta och att i de fall det är tillämpligt – styra övriga medverkande i uppdragen att arbeta enligt denna målsättning.' |
| Akademiska hus | AF-mall | 'Möjligheten till återbruk ska alltid undersökas vid ombyggnation. En inventering av vad som är lämpligt att återbruka ska göras tidigt i ett projekt för att öka möjligheterna att hitta avsättning för återbrukningsbart material.' |

| Material | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Anonymt stort privat fastighets-bolag | I ramavtal med Entreprenörer: 9. Miljö | 'Byggvara används här som samlingsbegrepp för material, materiel och vara. Vid ombyggnad av lokal/lägenhet ska i första hand så mycket som möjligt av befintlig inredning/planlösning behållas, i andra hand ska återbrukad byggvara användas, i tredje hand ska byggvara tillverkad av förnybar eller återvunnen råvara användas och i sista hand ska byggvara tillverkad av ny, ej förnybar råvara användas. Entreprenören ska före arbetenas påbörjande samråda med och till Beställaren redovisa valda lösningar och byggvaror. Val av byggvaror och utförande av installationer/-system ska ske utifrån ett livscykelperspektiv med inriktning på låg miljöbelastning och låga totalkostnader.' |
| Göteborgs Stad, Projekt Hoppet | TKA Mark och Utemiljö 6.1.3 Återbruk | 'Syfte: Klimatförbättrande åtgärder ska eftersträvas vid val av utformning och ingående material. Finns möjlighet att byta ut idag klimatbelastande material såsom betong och stål mot återbrukat material, så förordas detta.' |
| Akademiska hus, Språk-skrapan | AFA.21 - Översiktlig information om objektet | 'Ombyggnaden har utgått ifrån att i huvudsak bibehålla stomme, trapphus och centralt placerade ventliationsschakt samt med målsättningen att återbruka byggmaterial.<br>Återbruk av befintligt material enligt Återbruksrapport och beskrivningar samt ritningar. Byggvarubedömning utgår på återbrukat material.' |
| Akademiska hus | AF-mall | 'Entreprenören får utan ersättning använda eller tillgodogöra sig massor, material och varor enligt AB 04 kap 1 § 9 tredje stycket om det inte anges i kontrakthandling att de ska återmonteras eller återbrukas i annan fastighet eller på annat sätt tillfalla Beställaren eller annan, och Beställaren ser gärna att Entreprenören möjliggör återbruk av ytterliagre produkter genom vidare försäljning eller användning i andra byggprojekt. Eventuella omkostnader kopplat till detta täcks av Entreprenören och intäkter från försäljning tillfaller Entreprenören.<br><br>En redogörelse för vilka material som återbrukas och av vem (internt samt externt) ska tas fram och överföras till kontrollplan i enlighet med PBL och Avfallsförordningen. Sammanställning från loggningsverktyg kan användas för redovisning och Beställaren ska delges information som en del av slutdokumentationen.' |

| Material | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Bygg-företagen | AMA AF Konsult 10 AUC.2232 Konsultens plan för kvalitets- och miljöstyrning | 'Konsulten ska upprätta en miljöplan som ska vara samordnad med miljöåtgärder som beställaren beskriver i förfrågningsunderlaget. Planen kan vara en del av en övergripande projektplan.<br>Följande ska krav ska hanteras i konsultens miljöplan.<br>Projektören ska projektera för cirkulär ekonomi. Med detta menas:<br>• Säkerställa att det finns underlag för val av material och produkter avseende innehåll antingen genom att använda ett miljöbedömningssystem eller själv efterfråga och bedöma information minst enligt det branschöverenskomna formatet för eBVD.<br>• I första hand välja produkter och material som kan materialåtervinnas och leverantörer som återtar spill från installation för materialåtervinning.<br>• Projektera så att mängden spill minimeras.<br>• Dokumentera och redovisa val som påverkar avfallshanteringen till beställaren.<br>• Sammanställa information om material och produkter.<br>Startmöte och regelbundna uppföljningsmöten ska genomföras mellan beställare och projektör.' |

| Garanti | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Akademiska Hus | AFC.471 - Garantitid för entreprenaden | 'Garantitiden för hela entreprenaden är fem år. Om Entreprenören har erhålligt eller erhåller en längre garantitid för material eller vara som gäller denna längre garantitid även gentemot Beställaren.<br><br>Avseende föreskrivet material eller vara som ska återmonteras, eller återbrukas på annat sätt, inom den befintliga byggnationen gäller följande: Entreprenören ska senast i samband med monteringen av återbrukat material eller vara göra en fackmässig kontroll av materialet eller varan och Entrepreöneren ansvarar för bristfälligheter i materialer eller varan som skulle kunna ha upptäckts vid en sådan undersökning. Såvitt avser arbetspresationen gäller en garantitid om fem år.<br><br>Det saknas standardisering på marknaden i fråga om hur garantier ska hanteras vid återbruk. Ovan är ett förslag på skrivning vid framförallt återbruk inom Akademiska Hus. Om projektet återbruksintensivt så bör regleringen ses över.' |

| **Materialpåslag** | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Colligio | AFB.14 Ersättningsform | 'För begagnade material och produkter som tillhandahålls av entreprenören utbetalas ett påslag till entreprenören om [50%] procent på inköpspris.<br><br>Alternativt:<br>För begagnade material och produkter som tillhandahålls av beställaren utbetalas ett påslag till entreprenören om [5%] procent på inköpspris.' |
| Colligio | AFD.15 Varor mm | 'Entreprenören uppmuntras att i möjligaste mån använda återbrukade material och produkter för byggnationen, förutsatt att dessa uppfyller krav inom gällande regelverk och branschpraxis avseende säkerhet, giftfrihet med mera. Återbrukade material och produkter kan i Entreprenörens slutliga LCA för byggnaden ges utsläppsvärde 0 (noll) vilket ökar chansen till en bonus. Vidare får Entreprenören göra följande materialpåslag på återbrukade produkter och material:<br>• 50% om kostnaden för det återbrukade materialet eller produkten köps in för max 50% av likvärdigt nytt material eller produkt:<br>• 40% om kostnaden för det återbrukade materialet eller produkten köps in för max 60% av likvärdigt nytt material eller produkt<br>• 30% om kostnaden för det återbrukade materialet eller produkten köps in för max 70% av likvärdigt nytt material eller produkt.<br>Återbrukade material och produkter får inte köpas in till högre kostnad än 70% av likvärdigt nytt material eller produkt. Entreprenören ska redovisa återbrukat material eller produkt som avses införskaffas och användas, dess pris, samt ett referenspris för Beställarens godkännande, innan sådan införskaffande sker.'<br><br>*Notera att en ändring krävs i ABT 06 kapitel 1 § 10.* |
| Anonymt stort privat fastighetsbolag | I ramavtal med Entreprenörer: 6. Ersättning för kontrakts- och ÄTA-arbeten | 'Kostnader för material och varor ersätts med Entreprenörens verifierade kostnader för dessa enligt verifikat, samt med ett procentuellt påslag enligt bilaga 1. Det procentuella påslaget för av Entreprenören föreslagna, och av Beställaren godkända, inköpta återanvända/ återbrukade material och varor är 4% högre. Se bilaga 1.<br><br>'Utdrag ur bilaga 1: Procentuellt påslag för av entreprenören föreslagna, och av (f*astighetsbolaget*) godkända, inköpta återanvända/ återbrukade material och varor XX % beroende på upphandling.' |

| Erfarenhet och kunskap | | |
|---|---|---|
| **Aktör** | **Avsnitt** | **Formulering** |
| Malmö Stad | 2.3.8 Erfarenhet (teknisk och yrkesmässig kapacitet) | 'Anbudsgivare ska ha en organisation med erfordelig kapacitet, yrkeskunnande och erfarenhet för att utföra uppgradet. Anbudsgivare ska ha utfört minst 1 referensuppdrag under de senaste tre (3) åren (räknat från sista anbudsdag) avseende motsvarande uppdrag. Uppdraget ska ha varit väl utfört enligt uppdragsgivaren.<br><br>Bevis på kravuppfyllnad:<br>Bevis 1: Anbudsgivare ska till styrkande av att kravet enligt ovan är uppfyllt till sitt anbud bifoga uppgift om 1 refensuppdrag utfört de senaste tre (3) åren (räknat från sista anbudsdag) avseende motsvarande uppdrag. För referensuppdrag ska anges vem som är beställare, beställarens kontaktperson med kontaktuppgifter, en kort beskrivning av uppdraget och hur ett cirkulärt förhållningssätt har applicerats samt tidpunkt för genomförande av uppdraget och årligt avtalsvärde.<br><br>Bevis 2: Leverantören ska i anbudet bifoga CV eller meritförteckning för minst en (1) anställd med erfarenhet inom cirkulär ekonomi, eco-design och cirkulär design avseende beskrivning av projektet, samt uppgift om 1 referens uppdrag utfört under de senaste tre (3) åren. För referensuppdrag ska anges vem som är beställare, beställarens kontaktperson med kontaktuppgifter, en kort beskrivning av uppdraget och hur cirkulär ekonomi, eco-design och cirkulär design avseende beskrivning av projektet har applicerats samt tidpunkt för genomförande av uppdraget. Personen behöver inte ha varit anställd hos levereantören när uppdraget utfördes.' |
| Akademiska hus | AF-mall | 'Entreprenören ska ha kunskap och utrustning för att utföra demontering av byggmaterial och installationer som enligt handling ska återbrukas.' |

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