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The road to sustainable housing?!

-A study of how to include energy efficiency in the procurement process and building organisation when renovating apartment buildings

Master Thesis within: Sustainability Science

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Abstract

To lessen the environmental impact of our housing and achieve the goal of reducing energy consumption in buildings with 50 percent by 2050, it is crucial that energy efficient measures are included in renovations. Therefore, the purpose of this study is to increase the understanding of how energy efficiency can be incorporated in public procurement and building organisation processes in relation to the renovation phase.

A multiple case study approach was used, comparing four municipal renovation projects. Literature reviews and semi-structured interviews were carried out to enable an analysis from both a technical and organisational perspective.

Two ways of including energy efficiency, i.e. the qualification criteria or evaluation strategy, were discussed. The study showed that currently energy efficiency is not included in the procurement procedures to a great extent. The barriers were found to be lack of knowledge, financial constraints, short-term time perspective as well as organisational and contractual issues in the industry. Solutions that were brought up included information sharing, incentives for investments and organising the building process differently. A relatively new organisational form i.e. partnering was presented as an alternative to turnkey to enable energy efficient innovation and learning processes in all the involved organisations.

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1 Introduction

The essence of sustainable development builds on meeting fundamental human needs while at the same time preserve the life-support system of our planet (Kates et al. 2001). One of these fundamental needs is having a shelter, somewhere to live. Therefore, how we can provide more sustainable homes becomes a key question to reduce the pressure on our life-support systems while at the same time meeting human needs.

A building interacts with the natural environment in many ways. Firstly, the construction phase imposes disruption to the natural space both when it comes to producing materials and developing new areas. Moreover, transportation causes air pollution whilst construction noise pollution. In the running phase, resources are used for heating, producing electricity and providing water. Lastly in the demolition phase all materials have to be disposed. Hence, a building has a great impact on the natural environment during its life-cycle. To reduce these impacts it is therefore important to find sustainable building solutions. This requires a holistic approach considering economic, environmental and health aspects (Boverket 2006). Further, reusing, reducing and recycling are principles that need to be integrated in the planning process to facilitate sustainable buildings (Ibid).

1.1 Context

Energy, a centre piece in running buildings, is one of the main topics on the economic and environmental agenda today. The demand is persistently going up, prices and air pollutants are increasing and non-renewable resources are depleted. A reduction of energy use in buildings would not only benefit the environment but also the cost of operating the building. To reduce energy use and its impact on the environment, several strategies are needed. Conversion from fossil fuels to renewable resources and increased energy efficiency, both at the supply and demand side, are measures that need to be taken (Joelsson & Gustavsson, 2007).

Today, buildings in Sweden are consuming 42 percent of the total national energy consumption and almost 60 percent of this is used for heating space and water (SEA, 2007). If you look at the entire life-cycle of a building, it is the operational phase that consumes most energy. Therefore, the Swedish national Board of Housing, Building and Planning argues that a sustainable building is efficient and uses few resources (Boverket 2006).

In line with this, the Swedish environmental objectives aim at decreasing the total energy use per heated area unit in buildings by 20 percent by 2020 and 50 percent by 2050 using 1995 as index year (Regeringskansliet, 2006). To achieve this and still maintain a comfortable indoor climate, energy efficiency needs to be further developed (SEA, 2005). In the 1970s and early 1980s, Sweden was very progressive and energy efficiency improved significantly (Nässen, et al. 2008). However, in the late 1980s and 1990s energy efficiency enhancements stagnated and the development of energy efficiency in buildings almost came to a stand-still (Ibid). To improve the situation Sweden has developed a national action plan and improved the building regulations. The new building regulation was released in 2006 and contains mandatory requirements and general recommendations regarding energy management. When it comes to energy efficiency it is said that:

> "Buildings shall be designed in such a way that energy consumption is limited by low heat losses, low cooling demands, efficient use of heat and cooling and efficient use of electricity (BBR, 2006:2)."

And:

> "Dwellings shall be designed so that the specific energy consumption of the building does not exceed 110 kWh per m^2 of floor area (Atemp) per year in the Southern climate zone, and 130 kWh per m^2 of floor area (Atemp) per year in the Northern climate zone." (BBR, 2006:2)

What is noteworthy in the regulations and the action plan is that most of the measures are related to new buildings. However, the reality is that more than 90 percent of the buildings that are expected to be in use in 50 years are already built today (SOU, 2008).

The needs for reconstruction of apartment buildings are very large in Sweden. It is estimated that 60 percent of the apartment buildings need to be refurbished within the next ten years (SOU, 2008). A large part of this is an effect of the 'million program' that was initiated in the mid 1960s. At that time Sweden was experiencing acute housing shortages and therefore the government started a project to build one million apartments over a ten year period (1965-1975). Since these buildings need to be refurbished there is also a great opportunity for improving the energy efficiency of them. The reason for this is that energy efficient measures become more cost effective if they are integrated in regular renovations. It is argued that if this opportunity is not grasped, it may take another 30-50 years before an equally beneficial opportunity for cost-effective energy efficiency improvements returns (SOU, 2008).

To this end, advancing energy efficiency of existing buildings are crucial to achieve the above mentioned goals of reducing energy use in apartment buildings.

1.2 Problem discussion

Public procurement (from here on procurement) in Sweden has an annual turnover of about 500 billion SEK or 25 percent of GDP (Pedersen, 2008). In some areas, like building contracts and services, the public sector is the largest buyer (Ibid). In effect, the public sector has a large influence on the building industry. By integrating energy efficient measures in the procurement process could therefore be a way to steer the market towards innovation and more sustainable solutions. However, all procurement within the public sector has to comply with the law for public procurement. This builds on EU law and sets some boundaries when it comes to implementing environmental requirements, such as complying with free market regulations. When evaluating procurement bids the municipality can base it either on, lowest price, or the most economically beneficial tender. Earlier studies from procurement of new buildings have shown that lowest price is the most commonly used evaluation method.

Sorell et al (2004) writes that when it comes to the building sector, the contractors are generally selected through competitive tender based on lowest price with little communication between the involved parties. Low trust and averse relationships between actors are the norm and the contracts are often very detailed and complex. The low margins together with a fierce price competition have created an incentive for the winning contractors to cut costs. Since the contractors have to bid this hard to win the contracts they have stronger incentives to maximise margins by cutting corners. (Sorell et al. 2004)

In Miljöaktuellt (2008-04-28) municipal suppliers wrote that municipalities can significanly improve in demanding environmental criteria in procurement. They wanted to see:

- Harmonized and uniform procurement documentation
- More focus on environmental benefits
- More weight on environmental requirements
- Set emission levels instead of technical requirements

- More clear evaluation models

It is evident that a lot can be done in the procurement process and if the requirements come from the public sector the suppliers have to improve their environmental performance. External demands such as environmental requirements in procurement can instigate product development and act as an incentive for companies to invest in new environmental technologies. However, today most of the demands are qualification requirements meaning that they are not weighted. Therefore, suppliers argue that environmental considerations should be included in the evaluation requirements instead, so that environmental investments can give you a better chance of winning contracts. (Ibid)

In addition to the procurement process, the building organisation process in the industry has been problematic. The building process is a complex interaction between many different actors that performs different tasks in the process. Nässen et al (2008:7) conducted a study where interviewees had to describe the building process and one said:

> "First an architect is appointed who draws a house and then leaves the project, then you look for different consultants to make for example ventilation and electricity work and the project just moves on with not too much interaction. In order to produce an energy efficient building, all actors must work together towards a common goal. This does not exist today" (Ibid).

How the projects can be designed and organised to become a more interactive process is therefore an important aspect to realizing energy efficiency in buildings.

Further, there are many important stakeholders in a building process such as authorities, households, contractors, consultants, financial institutions and clients[1]. Nässen et al (2008) made interviews with people in the building industry and concluded that the most important actor in driving change in the industry is the clients. This was argued, because of their position as both a driver of the process and as the link between households and industry (Ibid). Accordingly, I will take on a client perspective in this study.

1.2.1 Purpose and Research Questions

The purpose of this study is to increase the understanding of how energy efficiency can be incorporated in the procurement and building organisation processes in relation to the renovation phase.

In order to fulfil this purpose the following research questions will be investigated and analysed form a client's perspective:

- In what ways can energy efficiency aspects be incorporated in the procurement process and tender evaluation when buildings are renovated?

- How is energy efficiency considered and incorporated in the procurement process for renovations?

- What are the barriers to incorporating energy efficiency in the procuring process and tender evaluation for existing buildings?

- How can the procurement and building processes be improved to allow inclusion of and innovation in energy efficient solutions when renovating existing building stock?

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1 The client refers in this thesis to the building owner and is responsible for the procurement of renovations.

It is anticipated that addressing these questions will contribute with an informative benchmark for further discussions on the inclusion of energy efficiency in renovations.

The first research question aims at guiding the thesis in constructing a theoretical framework for how to include energy efficient measures in a way that comply with the existing laws. The remaining ones are strategically formulated in order to address the research topic in a multidimensional way.

1.3 Significance and contribution of the Study

1.3.1 Significance

When it comes to the sustainability field the aim of this study can be seen as quite narrow and technical. However, inefficient use of resources is a sustainability problem, and we need to investigate and explore sustainability issues both at the local and the global level to find practical solutions at each level. Building inefficient houses locally will lead to higher energy consumption and wasteful use of resources that will have global effects. The local problems become global when they happen on an every day basis all over the world. If a building is inefficient it imposes costs on people and nature, every day, 50-100 years into the future. We therefore need to bring in new perspectives and ideas to the construction industry and find solutions to make our homes more efficient. One part of this is to change the procurement practices and building organisation.

One of the core questions in relation to sustainability science is which incentive structures can most effectively improve social capacity to guide interactions between nature and society towards more sustainable trajectories. These structures include markets, rules, norms and scientific information (Kates, et al. 2001). By demanding more energy efficient measures in the procurement process suppliers and contractors would have to find ways to supply more energy efficient solutions. Therefore the procurement of energy efficient measures could work as an incentive structure for the supply chain to push the market towards innovations in the building industry and more sustainable solutions, as well as providing more sustainable homes for people.

1.3.2 Contributions

Many studies have been done on energy efficiency in new buildings but very few have focused on the existing building stock. Hence by focusing on the renovation process of existing buildings, it is anticipated that this thesis will contribute with increased understanding of procurement practices and the building organisation process from an energy saving perspective. In addition, it is expected that this investigation will identify barriers and solutions to the inclusion of energy efficiency measures which could be of interest for e.g. municipalities. The concept of partnering is also explored as a new way of enabling energy efficient innovation and learning in the procurement and building process.

Further, even if the study has been done in the Swedish context it could be useful for other EU countries as well since procurement and building processes are similar within the Union. Overall the study hopes to provide new insights in the field and could hence be valuable to both academia and policy developers as well as municipal housing corporations and contractors.

2 Method

In this section the guiding methodology of the study per se as well as for the data analysis will be presented along with an in-depth outline of the applied research methods.

2.1 Methodology and Data Analysis

Due to the purpose of the study I have applied the Grounded Theory Approach as both a guiding methodology and as a method for handling the retrieved empirical data. Grounded theory allows the investigation to become an iterative process in which data collection and analysis is done interchangeable by building on both inductive and deductive features (Strauss & Corbin, 1998). Accordingly, the analysis starts almost immediately after the first data have been collected through the coding and categorisation of it (Bryman, 2004). This initial analysis will then influence the next step of the data collection process (Ibid).

This process continues until theoretical saturation has been reached. Theoretical saturation is the point where

> "(a) no new or relevant data seem to be emerging regarding a category, (b) the category is well developed in terms of its properties and dimensions demonstrating variation, and (c) the relationship among categories are well established and validated" (Strauss & Corbin 1998: 212).

This implies that I as a researcher rather sample qualitatively in regard to what is relevant for my purpose and quantitatively in terms of theoretical saturation.

The objective of the Grounded Theory Approach is not only to deductively test theory but also to inductively increase the understanding of the researched topic and by that add to the theoretical framework and, if possible, develop new theories (Svenning 2003). Accordingly, grounded theory is a way of deriving theory or concepts from data that has been gathered and analysed throughout the research process (Bryman, 2004). Based on the purpose of this study and due to the limited scope of existing theory dealing specifically with public procurement process from an energy saving perspective in the renovating phase of building life-cycles, the Grounded Theory Approach was deemed to serve this objective the best. In forthcoming section I will outline how I applied the grounded theory through the research methods.

2.2 Research Methods

Due to the set up of the study the research method consist of two approaches. Due to the theoretical focus of the first research question it will be addressed by a presentation of the current laws on public procurement and an outline of relevant literature addressing possible ways of considering energy efficiency in the procurement process. Information for answering the remaining research questions has predominately been retrieved through semi-structured interviews with clients and analysis of relevant procurement documents. In forthcoming section the applied research methods will be elaborated in detail.

2.2.1 Literature Review

For answering the first research question and to construct the theoretical framework, information has been retrieved through literature reviews. Materials and documents related to the procurement process have also been studied, analysed and compared, especially the administrative documents from the procurement, which includes the qualification and evaluation criteria. Relevant secondary data such as literature, newspaper articles and informational documents from the municipalities has also been used.

When choosing the documents I have tried to fulfil the four criteria for assessing the quality of documents that Scott (1990, in Bryman, 2004:381) presents: authenticity, credibility, representativeness and meaning.

2.2.2 Case Study

The overarching research method for addressing the remaining research questions have been a multiple case study. A case study is a research design that focuses on the intensive and detailed analysis of one or more cases and is preferred when asking why or how questions (Bryman, 2004, Yin, 2002). It is also recommendable when it is difficult to control events and when the study focuses on a contemporary issue (Yin, 2002). Further the case study approach is beneficial when using several sources of information such as documents, interviews and observations (Ibid). By choosing multiple cases you can satisfy different considerations such as contrasting cases or replicating cases to strengthen the interpretations of the findings (Yin, 2004). I am using contrasting cases to study how the organisation of projects, the building process and the ways of using selection and evaluation criteria, affects the outcome of the project in relation to energy efficiency. The sampling method was therefore purposive.

Case study sampling

As mentioned above purposive sampling was used in order to identify relevant informants and case-studies. This means that I tried to establish a good correspondence between the research questions and the cases selected (Bryman: 2004). Accordingly I have sampled the cases based on the relevance to my purpose and research questions. My ambition was to find clients in Sweden that have been making or are making large-scale renovations of apartment buildings. This was done in order to enable an analysis of both the procurement process and the organisation around the projects.

I set some criteria when contacting different municipal housing corporations. Firstly, the municipal corporation had to be more than 50 percent owned by the municipality to be affected by the procurement law. Secondly, they had to have made a large-scale renovation within the last 5 years. In addition, I have also chosen cases that I knew were different in some ways when it came to the organisational and procurement process to get different perspectives. Snowball sampling (Bryman, 2004) was also used since the initial interviews lead me to new cases and people that were of significance for the study.

I have chosen two partnering projects that are known for their proactive work when it comes to energy efficiency and two "normal" turnkey projects to compare their procurement and building process.

Case study presentations

In this section the chosen cases will be presented shortly.

Ängelholmshem

Ängelholmshem renovates 160 apartments in two buildings in an area called Sockerbruket. Complete renovations are made both inside and outside, including, facades, pipes, electricity, insulation and ventilation. Six different areas where procured where the first contractor is responsible for both time and technical coordination (Ängelholmshem, 2008). The six areas were awarded to six different contractors. This case is chosen to represent a "rife renovation".

Vätterhem

Vätterhem renovates an area called Råslätt which has a total of 2 500 apartments (H. Möller, Personal communication, 2009-03-18). They have divided the area into north and south. The

southern area renovates bathrooms, water and wastewater systems, air-treatment systems, electric systems and converts all apartments from electric heating to district heating. The northern area currently focuses on converting the heating system to district heating. Turnkey contract was used in the northern area while in the south they used turnkey with some features of partnering. (H. Möller, Personal communication, 2009-03-18). This case was also chosen to represent a "rife renovation" but also to ad information about using the partnering concept in a single project.

Alingsåshem

Alingsåshem is renovating 300 apartments in an area called Brogården. The houses were built in the 1970's and it was now time for a complete renovation. At the same plans to build new apartment buildings was in the pipeline so they decided to go for strategic partnering. Therefore, Alingsåshem procured all new building and renovation projects within a five year period in one partnering contract. This project was chosen because it was the first in Sweden to procure passive house technology for a renovation project.

Karlstads Bostads AB

Karlstads Bostads AB (KBAB) is renovating an area called Orrholmen. It is about 600 apartments and the renovations started in 1997-99 where they did the interior. In 2000 they started to work more with energy efficiency and in 2003 they initiated the plan to renovate the exterior of Orrholmen. They are decontaminating the facades and seal them as well as putting in additional insulation. Windows are changed, the roof is getting new coating and the attic is getting extra insulation. (G. Persson, personal communication, 2009-05-06). This case was chosen because it was the first strategic partnering project that was executed in Sweden.

2.2.3 Interviews

As indicated the primary data collection has been centred on semi-structured interviews with clients. For my purpose I needed respondents that were involved in the procurement process, so therefore the managers at the four projects was contacted for interviews (for a list of the interviewees see appendix A). Semi-structured interviews are a form where questions do not follow an exact order (Bryman, 2004). Instead, I have used a interview guide with specific topics that were addressed. The reason for using this technique was to avoid having an already set idea of what the answers should be like. By using a more open structure it is possible to allow the respondents to elaborate on topics and ideas that come up during the interview without having a pre set frame.

The adopted interview structure herein builds on a dialogue method developed by Hjern and Andersson (1998). It is constructed in three phases followed by, in this case, five 'subject boxes'. The first phase includes the introduction of the project and why I have decided to contact the person in question. In the next phase I describe how the interview will be conducted, ask if it is okay to record the interview and so fourth.

In phase three I introduce the project and ask basic question about the project which lead the interview into the subject boxes. The subjects often came in different order as the discussion proceeded and when the transcribing phase started they were taken down in the right boxes. By categorizing the data from the start some of the coding has already been done which helps the process of analysing the data. The subjects discussed were the following:

Box 1: Procurement method

What method was used for procuring?

Box 2: Energy Efficiency criteria

Are Energy Efficient criteria included in any of the stages in the procurement process, Why / Why Not? If yes, how was it initiated, who? Reasons and Barriers, Values

Box 3: Solutions

How could the procurement process be improved to include EE criteria? Methods? Tools?

Box 4: Time perspective

What time perspective is used for the investments, e.g. financial or building?

Box 5: Organisation and Contract

How is the project organised? What kind of contract is used? Advantages/disadvantages, values

Finally, a fourth phase rounded off the discussion. All actors was willing to get contacted again if additional information was needed or further questions needed to be raised.

Three of the interviews at Alingsåshem, Ängelholmshem and Vätterhem, were made at the organisational offices and visits to the renovation sites was carried out. The interview with Karlstads Bostads AB was a phone interview due to logistic reasons. Nevertheless, all interviews followed the above outlined guiding structure. Further, all interviews have been recorded and transcribed which has enabled me to go back and listen to the questions and answers again to avoid misunderstandings and misinterpretations as much as possible. The phone interview was made on a speaker phone and also recorded and transcribed. I conducted the interviews in Swedish and thereafter translated it into English.

2.3 Limitations

Regardless of the methodological considerations taken there are some limitations with the study, which possibly could affect the outcome of the study. First and foremost the possible subjectivity of the result analysis should be acknowledged. As Knutsen and Moses (2007:172) draw from Kant: "*The only thing we can observe are the perceptions of the world: how it appears to us.*" Accordingly, it is my responsibility as a researcher to in a veracious way retell the expressed opinions and problems in the interviews in order to increase our understanding of the investigated issue.

Overall, the limited scope of interviews and case studies could be regarded as a threat to the validity of the research. Accordingly a broader scope of informants both in terms of actual numbers and stakeholder groups would have been preferable. A more dynamic analytical framework would have been given if other stakeholders, such as contractors, could have given their opinion on partnering and turnkey contracts. However, due to the limited time-frames of the study along with the actual limited number of partnering projects this has not been possible. Likewise a more extensive representation of turnkey projects would have been beneficial. Nevertheless, in regard to the purpose of the study and the existing premises I perceive that the scope of the retrieved data to be extensive and reliable enough to do initial analysis of the research topic.

A further limitation that might have influenced the reliability of the result, and by that cause a bias in the analysis, was the tendency of the informants to want to give the 'right answer'. It came to my awareness that the respondents were keen on telling me that in the next project we will probably think about these issues and, it would be good to find a way to solve this. At a few occasions the respondent asked about concepts and what a certain technology is, which shows how the knowledge imbalance of the interviewer and the interviewee can be difficult to handle. I bring knowledge and awareness of a problem into the situation that may lead the respondent to answer in ways he/she would not otherwise have. Some might also try to avoid answering things

they do not have knowledge about or pretend to know and then by discussing these issues 'reveal' that they do not know what something is or mean. To this end, and in order to avoid any biases in the result, I have tried to take all these things into consideration when analysing and interpreting the data.

In the end, even if no definite or generalizable conclusions can be drawn it is contributing with bringing up new ways of dealing with energy efficiency in the procurement and exploring new organisational structures for discussion.

3 Background

In this chapter the background to the research topic will be provided. It will be structured around predominant theories dealing with green procurement and building processes in the building sector. Further an introduction to the analysis of barriers will be presented. The theoretical benchmark per se will not only serve as an introduction for the readers to the topic but also as a framework for analysis.

3.1 Green Procurement

The new legal framework regarding public procurement was enacted the 1st of January 2008. It builds on EU law which includes the idea of a European market where it is not allowed to take actions that hinders or aggravates trade across borders. Therefore, there are standardised procedures for public procurement that have to be followed. For example, depending on the expected price of the project, different procurement methods may be chosen such as simplified, selection and direct. The procuring unit can freely choose between the simplified and selection process. Direct procurement can only be used in exceptional cases. If the value of the contract is above certain amount you can choose from open, selective and negotiated. Open and selective have the same procedures as simplified and selection except that they should be advertised in EUT. (Pedersen, 2008)

The procurement methods include different stages that have to be included when procuring. The simplified process can be carried out with or without advertising the project. Request for Proposal (RFP) are sent out directly to the companies or by advertising. Qualification, negotiation and evaluation is done before awarding the project. In a selection process advertising is carried out and the received Expression of Interests (EOI) goes through a qualification procedure before the procuring unit decides which contractors that should go through to the next round and come with an offer. (Pedersen, 2008)

The different methods are shown in the figure below

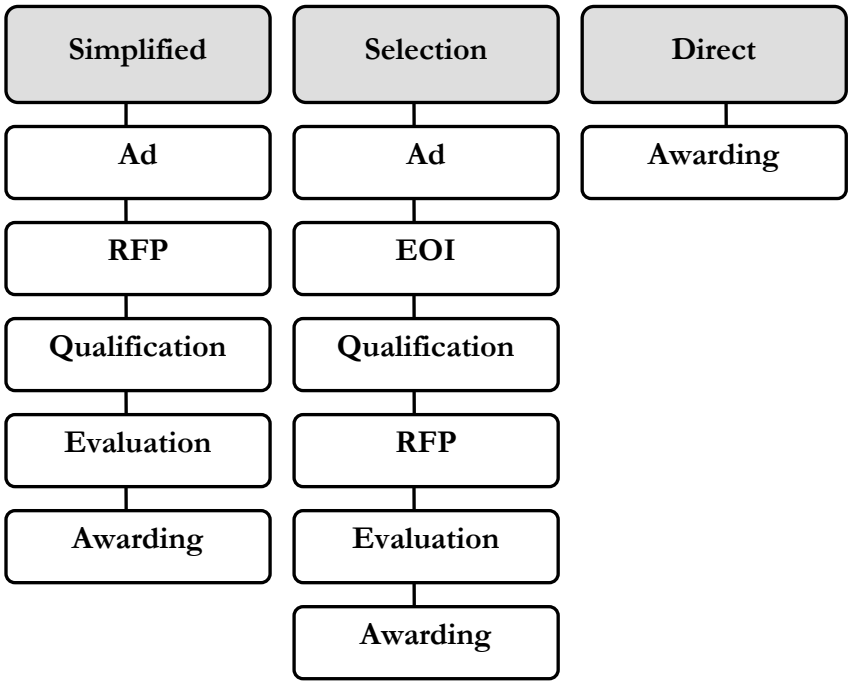


Figure 1 Procurement methods

When evaluating a contract the client can chose from two criteria: lowest price or the most economically beneficial tender. It was for a long time uncertain if social and environmental criteria could be included in procurement in addition to the pure economical factors (Pedersen, 2008). However, the new EU procurement directives allow two ways of including environmental criteria (Varnäs, 2008):

1. Formulated as mandatory environmental requirements
2. Considered in the tender evaluation

The first one relates to the prequalification stage where the client has decided a number of requirements that the tenders have to achieve. If they do not fulfil all the requirements they are disqualified. The mandatory requirements can be used both in the lowest price and economically most beneficial procedures. Environmental criteria in the tender evaluation can only be applied in the latter. The EU directive does not specify what kind of evaluation criteria that can be used, but point out that they should *"meet the needs of the public concerned*" (Varnäs, 2008:5).

Earlier studies have shown that mandatory requirements are used quite frequently such as demanding environmental management systems, but considering environmental criteria in the tender evaluation seems much rarer (Ibid).

3.2 Building Process

Since little research has been done on the organisation around refurbishment projects this part builds on existing research on new building projects. When a new building is to be constructed, several actors are involved and influences the energy use in the final building directly or indirectly (figure 2). Nässen et al (2008) made interviews with people in the construction sector and concluded that the most important actor when it comes to driving change in the building sector is the clients. This is because they sit in a key position between the demand from the households and the technical expertise from the actors involved in the building process (Ibid).

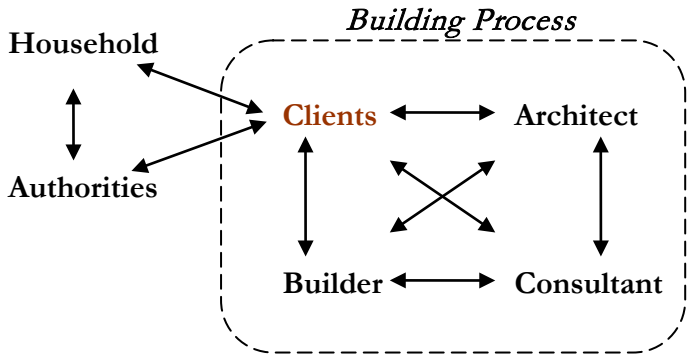


Figure 2 Building process (developed from Nässen et al , 2008:6)

Nevertheless, the building process is a complex interaction between many different actors that performs different tasks in the process. Most construction projects are realized by temporary coalitions of companies who relate through subcontracting (Sorell et al., 2004). Smeds and Wall (2006:6) discuss the importance of an integrative approach to the building process.

> "An integrative approach with close cooperation between project management, contractor, architects, consultants and other labour at all hierarchies is necessary already in an early stage of project planning to find the optimum solutions in advance".

For example, if the architect does not design a house that has a potential to become energy efficient from the start it is very difficult to change this in later stages. Therefore, it is important

to establish goals and find optimal energy solutions in the beginning of the projects to achieve energy efficiency. Sorell, et al (2004) came to a similar conclusion when discussing what is framed as the fragmented nature of the construction industry. The dominance of subcontracting and the fact that it is common to use a new team of designers, constructors and suppliers for each project, has many negative implications (Ibid). It restrains co-ordination and learning as well as preventing the development of skilled and integrated teams (Ibid).

In addition, Nässen et al, (2008) found that tools like life cycle cost (LCC) calculations have not been used by clients to a great extent because of limited knowledge.

> "The interviews show a remarkable consensus that LCC calculations are scarce in the building sector" (Nässen et al, 2008:7).

The focus of the clients is rather to minimise investment cost instead of the whole life cycle cost and that budgets for new construction is often separated from operation. Knowledge was also one of the most common responses when asked about the barriers for energy efficiency (Nässen et al: 2008:7). The limited knowledge was perceived to include both the clients and the architects (Ibid).

3.3 What is a barrier to energy efficiency?

A barrier to energy efficiency is one that is preventing a decision or behaviour that appears to be both economically and energy efficient (Sorell, 2004). These can be analysed by using the following questions.

1. What is the barrier?
    - Attain a clear understanding of the proposed barriers nature
2. What or who is it an obstacle to?
    - Identify the relevant actors and why energy efficiency is neglected
3. What does it prevent?
    - Identify the relevant behaviour or decision

4 Procurement and building process –clients perspective

Within this section the result from the interviews will be summarised in accordance to the research questions.

4.1 Procurement method

All projects used a similar procurement method. Ängelholmshem, Vätterhem and Alingsåshem used a simple process and KBAB used an open process including an elimination, qualification and evaluation phase.

4.1.1 Qualification and evaluation criteria

The qualification criterion includes the mandatory requirements. All clients had specified in the administrative documents that the contractors shall have a quality system and an environmental policy (B. Josefsson, Personal communication, 2009-03-19: KBAB, 2004: Vätterhem, 2007: Ängelholmshem, 2008). Vätterhem also demanded a specific environmental plan for the building, and Ängelholmshem asked for an environmental plan for sorting and taking care of harmful waste. It was only Alingsåshem that included energy efficient aspects in the qualification criteria and this in the form of procuring passive house technology (B. Josefsson, Personal communication, 2009-03-19).

When it came to the evaluation of the tenders all used most economically beneficial tender. However, how they weighted different aspects differed to some extent. The evaluation documents are developed by the client, sometimes with the help of consultants or lawyers. Often the evaluation sheet is standardised and used for many different projects. The tables below shows how the clients decided to value different criteria.

Table 1 Ängelholmshem evaluation criteria

Weight	Evaluation Criteria
55 %	Price
10 %	Organisational capacity
10 %	Work-environment system
10 %	Experience from earlier projects
5 %	Quality system
5 %	Environmental management system
5 %	Proposal for project implementation and time

As can bee seen from the table above Ängelholmshem put the majority of the weight on price. This was the only client using a traditional turnkey contract. As can be seen no weight was put on energy.

Table 2 Vätterhem evaluation criteria

Weight	Evaluation Criteria
30%	Price
20 %	Organisational capacity, experience and competence
20 %	References from earlier projects
30 %	Organisations proposal for partnering setup

Vätterhem used a turnkey contract with some partnering features. Less weight was put on price even if the partnering proposal also included evaluation on incentive structures and cost for the project. No aspects of energy were included.

Table 3 Evaluation criteria Alingsåshem

Weight	Evaluation Criteria
20%	Price
80%	Quality Including: • Organisational capacity • References from earlier projects • Experience and competence • Procurement possibilities

Alingsåshem used a strategic partnering contract and the evaluation criteria were based on two parts, 20 percent price and 80 percent quality. Above a summary of the areas evaluated under quality is provided. However, the real evaluation sheet had over 50 different criteria. The most important aspect was the organisation's capacity to implement a project using passive house technology but also how the consultant could contribute with new knowledge and solutions. Also, the managers from the interested companies got to present their company, deliver resumes, discuss how they planned to work with the project and the other firms. Therefore the companies' abilities and ideas were much more important than price. (B. Josefsson, Personal communication, 2009-03-19)

Table 4 Evaluation criteria KBAB

Weight	Evaluation Criteria
20%	Price
80%	Quality Which includes: • Organisational capacity • Experience and competence of the building process • Attitude towards business (e.g. environment, quality, business ethics, technology) • Ability to cooperate

KBAB also procured a strategic partnering contract and as can be seen in table 4 the evaluation criteria was based on two parts: 20 percent price and 80 percent quality (KBAB, 2004). In relation to the main areas they evaluated over 30 categories (see appendix B). They also met with the organisations to discuss the implementation strategies and coordination. In addition to organisational capacity and experience, focus was put on the organisation and their values. It was argued that partnering builds on trust so finding the right partner was very important. Also, since quality is very important, especially when it comes to energy efficient houses, it was crucial to find the right people. Focus was put on finding people with the right background and values. They strived to find people that were passionate about efficiency questions and could come up with new ideas and find new solutions. (G. Persson, personal communication, 2009-05-06)

"The organisation with the best people when it comes to openness and efficiency with the right values will be awarded the project" (Ibid)

4.1.2 Energy efficiency Initiatives and Incorporation

All companies have joined SABO's energy challenge "skåneinitiativet". This initiative was initiated to set a target for its members to decrease their energy consumption with 20 percent by 2016. However, so far, few clients have incorporated energy efficiency measures in procurement documents. As expressed by one of the clients

> "We have not looked at how we can consider specific energy efficient solutions in the procurement process, but it would be good if it was possible." (P. Henrysson, Personal communication 2009-03-25)

Another client had joined the energy challenge because their technicians wanted to share experiences with other companies, both good and bad, in order to improve the energy performance (H. Möller, personal communication, 2009-03-18). However, still it seemed like cost was the most important factor when it came to the renovation that Vätterhem did. A part of the partnering contract was to decrease the energy consumption a little, if it was possible, but they thought that the consumption in the area was low already (150 kWh/ m^2). Instead it was argued that "*cost will go down*" (Ibid).

Two of the companies have incorporated energy efficient thinking to a much greater extent. The initiative for using passive house technology for the renovation at Alingsåshem came from Hans Ek who has worked on building the first passive houses in Sweden and lives in the town. He approached Alingsåshem with the idea to build passive houses. With the current environmental debate the managing director saw an opportunity in this. She wanted to both build new houses with passive house technology, but also to renovate a "million program" area according to the same technology. She got the steering committee on board and started the project. (B. Josefsson, Personal communication, 2009-03-19)

Alingsåshem procured passive house technology as well as energy efficient fridges, freezers and washing machines to lower the energy consumption in the houses. In addition district heating, solar panels and woodchips is used to cover the little energy that is needed for heating the houses. It is projected that energy consumption will decrease from 216 kWh to 92 kWh per m^2 (including household electricity, water and heat), which is well below the new building regulation for new buildings. (Ibid)

The same goes for KBAB who started to work more intensely with energy efficiency in 2000. They employed an 'energy hunter' to be able to track down energy intensive houses and equipment to lower the energy consumption. For example at Orrholmen they are decontaminating the facades and seal them as well as putting in additional insulation. Windows

are changed, the roof is getting new coating and the attic is getting extra insulation. For this project KBAB received NBOs energy price 2008 with the statement

> "The project is a forerunner where KBAB is taking a great leap and show that it is possible to do large scale investments in energy efficiency since they become profitable due to large energy savings". (KBAB, 2009)

The energy consumption for heating, hot water and electricity has decreased from 255 kWh/ m^2 to 110 kWh/ m^2 in the finalised apartments (KBAB, 2009). This is in parity with the new building standards.

Energy efficiency was not a part of the procurement documentation per se, but it was an important part of the evaluation of the contractors. It was important for KBAB to know that the contractor they would work with shared the same values, when it comes to energy efficiency and environmental sustainability:

> "The contractors' values will have a great impact on the project and what solutions they will come up with. Since it is so important with good quality when it comes to energy efficient houses, it was very important to find the right people that were willing to put in extra time to ensure this." (G. Persson, personal communication, 2009-05-06)

Also because they have an energy hunter employed it was argued that they did not have to specify any certain criteria since this person would be involved and make sure that the best possible solutions would be integrated in the different projects (Ibid).

KBAB has not built or renovated according to passive house standards but tries to do their best in achieving low energy consumption. In the newly constructed houses they have almost reached passive house standard and it was argued that:

> "A name is not important for us; the goal is to build good low energy houses. It is important that you do not get afraid of a concept since it is a possibility that you will not succeed and then you may not try again and nothing improves." (Ibid)

The client argued that it is more important to try to do your best and see how far you can take it. (Ibid)

> "By trying to improve continuously with no limits we can come even further." (Ibid)

Both Vätterhem and Ängelholmshem wanted to build low energy houses in the future but not passive houses. One client said that

> "We will definitely build low energy houses in the future but have not thought about building passive houses or renovating according to passive house technology". (P. Henrysson, Personal communication 2009-03-25).

It was also mentioned that in the future they will not only focus on lowering the energy consumption but also to try to find new solutions to energy production such as solar power (Ibid). What is interesting to point out is that later in the interview it came to my awareness that the interviewee was not sure about the concept of passive houses, when he directly asked me what passive house technology meant.

4.2 Time Perspective

All clients argued that they try to have a long-term time perspective: one client argued that

> "We cannot only focus on here and now, but it is important to have a long-term time perspective." (P. Henrysson, Personal communication 2009-03-25).

However, when asked if this was done in any practical way, the answer was "no, not now, we are only renovating" (Ibid). Some also argued that it depends on the investment but that they in general try to have a long time perspective, up to 8-15 years (H. Möller, personal communication, 2009-03-18). When you think about a buildings lifespan this seems rather short.

On the other hand, two of the clients seemed to incorporate a more long-term thinking in their way of working:

> "Alingsåshem have embraced a more long-term approach to building investments, so even if the initial cost may be higher a final product with higher quality is more important." (B. Josefsson, Personal Communication 2009-03-19)

To build and develop new areas is expensive but if you look in the long run a building will stand 50-100 years and in that perspective the initial cost is normally just around 15 percent of the lifecycle cost. The remaining 85 percent is energy consumption, service and management of the buildings (Ibid). Therefore the client argued:

> "It is not crucial if the cost is one SEK more or less today, it is the quality that is important." (Ibid)

To showcase their commitments the board of Alingsåshem decided to take a decision in principle to only build passive houses in the future.

> "It is more expensive, so you have to get the residents' association and the residents to embrace the plans and see the long term benefits of it". It will cost more money initially but in the long run it will pay off." (Ibid)

They also try to look at the materials that are being used to find environmentally sound options. (Ibid)

One client also argued that

> "Since we are a municipal corporation we are in a better situation to think long-term since we look at a long term ownership". (G. Persson, personal communication, 2009-05-06)

In contrast normal real-estate that do not focus on long-term ownership, but will only sell the building, has no incentive to incorporate energy efficient solutions that will be profitable in the long run. It is more about finding what is trendy at the moment to be able to sell at a good price. (Ibid)

> "We on the other hand that will own, maintain and operate these buildings for a very long time need to have a more long-term perspective". (Ibid)

A quote that showcases the long-term commitment is

> "We are now focusing on district heating, solar power and wind power. We are preparing all new buildings and planned renovations to be able to have solar panels on the roofs. Through our cooperation with "Vindkraft Vänern" we will also supply all electricity for the buildings (not household electricity). That is the way we work, first we are decreasing the energy consumption as much as we can, thereafter we make sure that the energy we need comes from renewable resources." (KBAB, 2009)

4.3 Contract and Organisation

The interviews revealed that two main types of contract were used in the renovation process: turnkey or partnering. Turnkey contracts have for a long time been the norm in the construction industry and it is only recently that partnering has come to play a larger role.

4.3.1 Turnkey contract

A turnkey contract is an agreement where the contractor is supposed to deliver a product that is ready for use when handed over to the contracting party. When using this type of contract the client has to specify from the start exactly what is to be done and you cannot change as you go (B. Josefsson, Personal communication, 2009-03-19). Two of the clients used turnkey for their projects. Expressed by one of the clients:

> "When procuring a function through a turnkey contract more focus is put on the contractor to present a good alternative both when it comes to price and sustainability." (P. Henrysson, Personal communication 2009-03-25)

However, many of the clients found it difficult to use turnkey in renovations because of the need to specify what is to be done. To achieve energy efficient solutions you therefore need a very competent procurer (H. Möller, personal communication, 2009-03-18). Even then it can be problematic since you do not always know exactly what is needed.

> "When dealing with renovations it is often when you stand in the house with the contractor that you realize what needs to be done, and then it is too late." (G. Persson, personal communication, 2009-05-06)

However, in addition to the problems with specifying measures, the clients argued that the organisation of a turnkey project is not optimal for renovation. A few reasons for this was the loss of knowledge and the need to build up a new organisation every time you started a new project.

KBAB expressed it as:

> "Just when everything starts to work efficiently and you have managed to get a good organisation up and running, you are done, and everybody you worked with is dispersed and all knowledge lost. In the next project you have to start all over again. A lot of time is spent just to build new organisations again and again." (G. Persson, personal communication, 2009-05-06)

Between 1998 and 2004 Alingsåshem renovated an area called Östlyckan which was done in stages:

> "The first stage was done by PEAB and the second by Skanska, the third by NCC and then Skanska again. The different contractors then had to start a new process every time and you could not take advantage of the experience from earlier projects." (B. Josefsson, Personal communication, 2009-03-19)

Another example is Ängelholmshem who used a divided turnkey contract for their renovation when they procured six different areas (P. Henrysson, Personal communication 2009-03-25). All areas ended up with different contractors. This presents a problem when it comes to coordination and quality. Alingsåshem had experience from projects where the consultant made drawings that the contractors could not execute (B. Josefsson, Personal communication, 2009-03-19). Different actors in the process have their own specialisation and focus on their area without interacting much with the other parties. Expressed by a client:

> "Everybody tries to do their best in a project but the way the procurement process and contracts are laid out are often spoiling the focus of what is best for the project." (G. Persson, personal communication, 2009-05-06)

In response to this situation KBAB tried to find a new way of working. They invited the large contractors in the area and discussed possible solutions, they came up with partnering.

4.3.2 Partnering

Partnering can mainly be used in two ways, as a single project or what is known as strategic partnering (G. Persson, personal communication, 2009-05-06). Vätterhem used a turnkey contract with features of partnering for one part of their project. When sending out the request for proposal they asked for a partnering suggestion from the companies and what incentive structures they could offer (H. Möller, Personal communication, 2009-03-18). It was explained that in a single project partnering contract a specific delivery is not established but you work with the contractor towards a common goal when it comes to cost and design (Ibid).

> "I as a client have told them what I want and then Skanska bring out a proposal of how to do it. Then they can come with suggestions that if we do this much more, this is how much it will cost". (Ibid)

KBAB was the first organisation in Sweden to realize a strategic partnering contract called "many projects in one." KBAB is defining strategic partnering as

> "…a long-term commitment between two or more organisations with the intention to achieve certain economic goals by maximising the effectiveness of the participating organisations resources. This demands that the traditional relationships and roles are changed to a common culture without organisational boundaries. The partnership is based on trust, dedication to common goals and an understanding of each others individual expectations and values. The expected advantages are production and cost effectiveness, improved possibilities for innovations and continuous improvements of qualitative products and services." (KBAB, 2004:2)

They got help from a lawyer to ensure that they complied with current procurement laws. In total the procurement included the option of building/renovating 18 different projects. Some of the specifics of the contracts includes

- For each project a new contract agreement is developed after consultations with the contractor.
- Secondary contractors are appointed after consultation between the parties.
- The organisations should continuously keep each other updated on conditions that may affect the projects.
- The organisations should account for and maintain the organisation that is important for the different projects effective implementation. The agreed organisation can only be changed after consultation between the parties.
- If a project is not implemented or the collaboration is terminated the parties will split the cost of already bought services. Personnel cost is paid by respective part.
- The co-operation can be terminated after each project if the following conditions are not fulfilled
    1. The common goals of the project was not achieved
    2. Key people in leading positions are quitting or opt out
    3. One part is indicating inadequacy within the areas of solvency, tax management, environmental responsibilities or work ethics. (KBAB, 2004:4)

Alingsåshem procured all new building and renovation projects within a five year period in one partnering contract:

> "The projects will be preformed by the same contractor instead of procuring each project by itself. It also mean that we do not have to specify from the start exactly what is to be done, instead you work with the contractor to find good solutions. After each house that is completed an evaluation is made to work out a new contract." (B. Josefsson, Personal communication, 2009-03-19)

It is evident that the clients find partnering to be more flexible than a turnkey contract. You do not have to specify details form the start and have the option to go through with one more project after the evaluation.

There was one organisation that never had used a partnering contract and was unsure of how to do it. They were thinking about using partnering in the future but argued that:

> "Partnering is good, and you would like to find a good partner without looking at the price. Maybe you have to write a proposal that fits the partner you want. But we have our hands tided back, you have to have everything done and be very clear and it's not good to take whoever you want. You have to follow the procurement laws. Maybe next project will be in partnering, but I do not think so, it will probably be a turnkey contract with more weight on energy." (P. Henrysson, Personal communication 2009-03-25)

What is interesting to point out is that the interviewee later asked me how a procurement in partnering would work and how it could be done, showing that he had limited knowledge about the concept.

Advantages

The clients using partnering saw many advantages with it. It was expressed by all of the clients that you work with the contractors from the start of the project to find optimal solutions. When dealing with renovation it is beneficial to have the contractor there already from the inventory stage to find out what needs to be done (G. Persson, personal communication, 2009-05-06). This saves both time and money since every procurement process is very expensive.

> "Procuring a new turnkey contract every time is a waste of money both for the municipality and the contractors. We have to guess what needs to be done and how much it should be and then the contractors has to spend around SEK 100 000 to work on calculations for the project." (Ibid)

This cost is avoided when using partnering and the contractors do not have to be involved in a fierce price competition trying to cut cost sometimes at the expense of quality. By using partnering the organisations use open financial books and both parts know the actual cost.

> "In partnering the contractor gets to see the building from the start and make an evaluation and price based on 'reality'. There are therefore few surprises and you can be more creative in a partnering project." (Ibid)

The clients seemed to agree that partnering was a nicer way of working since you are on the 'same side'. The openness in the process and finding solutions that fits all parties was a common argument from all clients. Better quality was another advantage expressed by the clients.

> "In a turnkey contract, small things like fillings around the windows that are very important for making energy efficient houses may be neglected, which does not show in the final inspection. The contractors may save money by doing this and the client has to pay for it in higher operation costs. In partnering it does not pay of to be negligent since the contractor will get paid for the work they put in anyway. There is no incentive for cutting corners. It allows us to build safer with higher quality and keep the competence within the project the entire time". (B. Josefsson, Personal communication, 2009-03-19)

Similarly:

> "It is important with good quality when it comes to building energy efficient houses. When you have time and budget limits it is easy to get negligent. Partnering allows you to be more flexible and make things right. Even if it takes more time on a specific task, the logistics around the project is getting more and more efficient so as a whole the project runs smother and ensures higher quality." (G. Persson, personal communication, 2009-05-06)

Better contact with the contractors and more interaction between the different parties in the process was also expressed as advantages by the clients. For example:

> "They have different competencies, the consultant knows how to draw and the contractor how to execute, if you can get these two to work together the end product will be better. In partnering, the consultants and contractors are working together towards a common goal. They are trying to find the optimal solutions by bringing their own specialist areas to the table." (B. Josefsson, Personal communication, 2009-03-19)

You are allowed to be more involved:

> "Partnering is not about standing as an audience watching the building process, but being involved in it. You have to be a part of the project and be there at the building site and think about solutions and solve problems. Partnering gives us the possibility to be close to the staff at the building site. The carpenters work together with our staff to find solutions." (G. Persson, personal communication, 2009-05-06)

This also has the advantage that you keep and develop knowledge in the organisation. One client said that it had helped them to be better when procuring other smaller projects.

> "When you participate and work closely with all the different parties in the project you also develop your own organisations competence in a way you never do in a turnkey project." (Ibid).

When walking around in one of the renovated apartments at Alingsåshem, Josefsson described areas where they had come up with new solutions and new materials after making an evaluation of the first building that was finished.

> "You learn all the time and become more efficient. You talk in a different way with your partners and want to find optimal solutions for both parties. Therefore you will also get a better end product.". (B. Josefsson, Personal communication, 2009-03-19)

Disadvantages

First when asked about disadvantages the clients said that there is none. But after thinking about it for a while some issues were raised. One of them was time.

> "It takes more time since you have more meetings to discuss progress and solutions. If you do not have time with this the whole idea with partnering is failing." (H. Möller, personal communication, 2009-03-18)

> "You have to spend a lot of your own time in the project". (B. Josefsson, Personal communication, 2009-03-19)

> "If you are not willing to commit and invest time you could just as well go for a turnkey contract, since you will not get the most out of the concept. You should not do it because you think it is easy then it can become negative." (G. Persson, personal communication, 2009-05-06)

In addition financial risk and the fact that you become "too much like buddies" and therefore does not guard your own interest in the same way was mentioned (H. Möller, personal communication, 2009-03-18). Alingsåshem had incorporated all financial risk and would therefore be responsible if something goes wrong (B. Josefsson, Personal communication, 2009-03-19). But on the other hand it was argued that they get all the benefits if it goes very well (Ibid).

It was also discussed that it was important to get the right people for the project and be willing to invest time and be very open.

> "If you have the wrong people with wrong attitudes the project will not work. You cannot sit as an audience but have to get involved. If you are not willing to commit, it can lead to lower quality and less innovative solutions." (G. Persson, personal communication, 2009-05-06)

In the end it was concluded from all clients that partnering is what you make of it and you have to take the time to be involved. If you do, it is a great way of working. At KBAB they said that:

> "You cannot go back when you have tried this way of working. We have tried turnkey so many times and know how hard it is to get it right, this was the first time we felt like all pieces fell together." (Ibid)

4.4 Barriers to Energy Efficiency and solutions

Barriers

When it comes to barriers one client thought that cost could be a problem for many organisations. Alingsåshem is renovating according to passive house technology and it was argued that it is important to be in a good financial situation since a project like this cost a lot of money initially.

> "We do not make a profit the first years so you have to be patient and reap the benefits later. If you are a company that are making losses already it may be difficult to do this kind of investments." (B. Josefsson, Personal Communication 2009-03-19)

Another barrier that was expressed was the building organisation.

> "When the contractors come in late in a project, which is often the case in turnkey contract, and things are already set from a consultant it may be difficult to build energy efficient. You have to start about a year in advance; otherwise the time will be too short to carry out a good renovation." (G. Persson, personal communication, 2009-05-06)

One other thing that was mentioned is the procurement documents. You have to be very careful when writing the procurement documents since you cannot bring in more projects later on when it comes to partnering or other measures when it comes to turnkey.

> "You have to write what you want to do and do what you wrote." (G. Perssson)

KBAB had to think 6-8 year in advance what project that could be relevant for renovation and put them into the contract since you cannot add projects later on.

Evaluating energy consumption was also a concern for one of the clients. The contractors use different evaluation programs and different technologies, which have to be maintained in different ways. For example, in one proposal there was a device that had to be installed in all apartments and required to have its filter changed by the residents every 6 months or so. If this is not done the energy efficiency performance will go down significantly. It was decided that the risk of the filters not being changed was too high, so instead they had to look for a solution that was easier to maintain. (H. Möller, personal communication, 2009-03-18)

Another thing that was expressed as a barrier is the difficulty of implementing new ways of doing things in an organisation.

> "You are used to do it one way and sometimes it is hard to change." (H. Möller, personal communication, 2009-03-18)

Similar:

> "It is easy to get stuck in old ways of doing things and do it the way you have always done it." (P. Henrysson, Personal communication 2009-03-25)

Solutions

Using partnering has been a common answer, among the clients that have used it, to solve many of the problems that were addressed. Josefsson (Personal Communication 2009-03-19) said that procuring passive house technology in partnering is one of the best ways of getting energy efficiency into the procurement process. The reason for this is that you sit down with all actors to produce the best solution. Then you evaluate and look at the good and the bad things and try to be better the next time. This enables innovation and new thinking and also keeping knowledge within the organisation (Ibid). Persson (Personal communication, 2009-05-06) followed the same line of arguments and also said that energy audits should be done before all projects start.

One client argued that partnering is a good solution to many of the problems that occur in a turnkey contract. When you are cooperating with the contractors from the start you can steer the process in another way and change as you go. In partnering the contractor gets to see the building from the start and make an evaluation and price based on the "reality". (G. Persson, personal communication, 2009-05-06)

A new evaluation system was discussed by one of the clients. They were working on introducing a system where you can 'play' with the numbers in the evaluation form.

> "It would be good to see what happens if we put this much weight on price and this much on organisational capacity for example. There might be a way of including energy efficiency in this form." (H. Möller, personal communication, 2009-03-18)

Another solution that was discussed was the possibility of sending out a model for estimating energy consumption to the contractors. If all use the same it is easier to evaluate them in an objective way. (Ibid)

One client expressed the difficulties with including energy efficiency and was not sure how to do it but said that it was very important to find a way:

> "It would be good if you could include evaluation criteria's for emissions, transport and locally produced materials." (P. Henrysson, Personal communication 2009-03-25)

LCC analysis as a tool for bringing in more long term perspective was also discussed but few used it in a larger scale. One client had used LCC analysis when procuring heat pumps but not in any other cases (H. Möller, personal communication, 2009-03-18). It was argued that in the future it would probably be used more but that they needed more knowledge and information about it (Ibid). Another client had not been using LCC for renovations either but did not think that it would be a problem to do so (P. Henrysson, Personal communication 2009-03-25).

5 Analysis

In this chapter the result of the interviews presented will be analysed in accordance to the research questions and the theoretical background.

5.1 Energy Efficiency in the Procurement process

5.1.1 Ways of incorporating Energy Efficiency

When it comes to ways of incorporating energy efficiency in the procurement process it is comparable to how you include environmental criteria. Varnäs (2008) described two different ways of including this in the procurement process.

1. Formulated as mandatory environmental requirements
2. Considered in the tender evaluation

Studies have shown (Pedersen, 2008; Varnäs, 2008) that mandatory requirements were used quite frequently such as demanding environmental management systems. This is also confirmed by this study. All clients required the constructors to have environmental policies and prepare environmental action plans for the renovations. However, it was only one of the clients that included energy efficient measures in the qualification criteria.

Varnäs also found that environmental criteria in the tender evaluation seemed much rarer. This was also the case in the projects studied that used turnkey contracts. However, in the strategic partnering projects the evaluation included environmental aspects. Quality was weighted to 80 percent and for the clients it was very important to know that the contractors shared their values when it came to environment and energy efficiency. However, no clients had taken it further to weight energy consumption in the evaluation.

A practical way to include energy efficiency in the procurement process is to either specify the technology in the qualification criteria or weight it. For example as you have 20 percent weight on price you could include energy consumption 20 percent. You could formulate a demand like:

-The contractor shall declare expected energy consumption/ m^2 of the building.

This would then give incentives for contractors and suppliers to come up with good energy efficient solutions.

To take energy efficiency even further it could also include transport etc:

- The contractor shall declare expected emissions (energy consumption) over the buildings lifecycle, from transport to final demolition.

However, it can be questioned if it is possible to execute the point due to two reasons. Firstly, the contractors abilities to produce this information, and secondly EU procurement law. Making a declaration over expected emissions in regard to the lifecycle of a building would be very time consuming. A major national/ international database and software programs would have to be developed in order for companies to make reasonable and comparable evaluations. When it comes to EU law it could probably be argued that it would benefit local actors because transport emissions would be lower when using local actors. It may therefore be seen as a barrier to the free market.

5.1.2 Energy Efficiency in the procurement process today

Up until recently energy efficiency has not been considered to a great extent in many of the organisations. The clients that used turnkey contracts for the renovations had not incorporated energy efficiency at all when procuring. However, due to the environmental and especially the climate debate, the organisations have started to think more about these issues. Therefore, the seemingly common positive attitude towards incorporating energy efficiency should be highlighted. All organisations in this study have joined the SABO energy challenge and therefore committed to reduce their energy consumption. Even if the organisations that were using turkey contracts have not applied this in a renovation project yet, it is a start that they are acknowledging the problem and is willing to act.

On the other hand two of the clients actively work with energy efficiency by integrating it in their way of working. The partnering concept has enabled the organisations to incorporate energy efficiency into the entire project cycle from procurement to the final product. By not having to specify measures from the start has allowed them to work together with the contractors to find new innovative solutions. For these organisations environmental and energy aspects were important already from the start in the procurement process. One procured passive house technology while the other used the evaluation phase more actively. Sharing the same organisational values and finding people that were passionate about energy efficiency and environmental aspects were very important factors for this. Weight was put on quality instead of price and by evaluating and using the same people they could improve energy performance significantly. One of the clients also had an 'energy hunter' employed to make sure that the energy aspects are always considered in the different processes and stages of the project.

It stands clear that the organisational values and peoples' initiatives have a very important role to play. Environment and energy efficiency needs to be incorporated in the organisational culture. By also making sure that the constructors share the same values and can provide people with the right knowledge then becomes a key question. Including this in the evaluation will send a signal to the market that these services are needed and hopefully lead to change in the industry. In order to make this a reality more client driven initiatives are needed. Two of the clients have showed that by using a partnering concept you can incorporate energy efficient solutions in a very reasonable way and the tender evaluation can include more value based criteria.

5.2 Barriers and solutions to Energy Efficiency

Most energy efficient measures are cost-effective (Sorell et al, 2004). However, most of the time these investments are still not being implemented, this section will discuss barriers and solutions to energy efficiency.

5.2.1 Knowledge

It came to my attention during the interviews with a few of the clients that they were unsure of concepts and how to include energy efficiency in the procurement process. Nässen et al (2008) found that the most important actor in driving change of the building sector is the clients. Therefore, clients' lack of knowledge becomes very problematic since it presents a barrier for the entire building process. If the client uses a normal turnkey contract without specifying energy efficiency measures or using evaluation criteria for energy consumption, it impedes the whole supply chain from making progress.

A question that follows then is why this knowledge gap exists. Energy efficiency has been on the agenda since the 1970s, so it is not a new topic. Back then it was a more economical debate

because of the oil crisis and rising prices of energy. In the 1990s, the efficiency improvements stagnated and it has continued until recently. However, it can not be argued that the concepts are new. A few of the organisations mentioned that it was difficult to implement new ideas and energy efficient measures because of the attitude: 'this is the way we have always done it'. Therefore, resistance or willingness to change could possibly explain a part of the knowledge gap.

The last years, energy prices have gone up and the debate around energy issues are extensive. As a reaction the awareness and willingness to act seems to be rising. Eighty-nine municipal corporations have joined the SABO initiative (SABO, 2009) and all clients in this study are a part of it. However, when it comes to turnkey contracts energy efficient solutions will never be better than the competence the procurer holds. Hence, it is important to take this opportunity to develop knowledge and capacity. A large part of the responsibility lies on the clients to take initiative to facilitate for change and innovation in the building sector. Therefore, knowledge and capacity development in this area is crucial. The SABO initiative is a good example of how it can be done and should be used as a network for spreading information. National initiatives from governmental agencies would also be a way to go forward. However, it is not until the clients process the information and starts to incorporate the ideas that we will see a change.

5.2.2 Financial constraints and Time perspective

It was pointed out that investment in energy efficient technology is more costly initially and will only be profitable after a few years. This has a few implications. First, for organisations that are in a difficult financial situation it can be difficult to find the capital needed. Second, the organisations often have a short-term time perspective, significantly because of the economical system that demands short term return on investments. Therefore, it may be difficult to persuade the board of directors or financial institutions to invest in more long-term, higher cost projects. However, municipal corporations would benefit a lot from introducing a longer time perspective since they operate the buildings. The problem is that contractors and consultants do not share the same incentives. Sorell et al (2004) concluded that, while the client has an incentive to minimise whole-life costs the contractors and consultants do not as they have no long-term interest in the building and are not accountable for performance in use. Therefore they could benefit from cutting corners in order to lower their costs.

To resolve the problem with financing, the government could start to show the way by encourage these types of investment. The introduction of a tax reduction for energy efficient renovations has been proposed by the opposition in the parliament (SABO, 2009a). Setting up a fund for energy efficient investments could also be a possible solution. Both these measures could enable clients to make the investments needed.

A tool such as life cycle cost calculations (Nässen et al, 2008) is a way to bring in more long-term financial thinking in the organisations. However, the long-term perspective is something that needs to be incorporated in the organisational culture. In this case strategic partnering seems like a good solution to avoid the short-sightedness in the process, since it forces both the client and the constructor to think more long-term. Both clients that used partnering had a much more long-term perspective when thinking about investments. One client argued that to build and develop new areas is expensive, but if you look in the long run a building will stand 50-100 years and in that perspective the initial cost is normally just around 15 percent of the lifecycle cost. This is the perspective that is so crucial to facilitate change in the industry.

In the building industry the short term return on investment thinking is not suitable since it will impose costs on generations to come. Therefore it is important to change the view from a short-term financial thinking to a long-term intergenerational perspective. It is only when we look at the entire lifecycle and interaction between the building and its environment that we se the

benefits of environmental and efficiency investments. This study has shown that it is possible to use more value based evaluation (quality over price) instead of pure economical rationality which has led to more long-term solutions.

5.2.3 Evaluation criteria

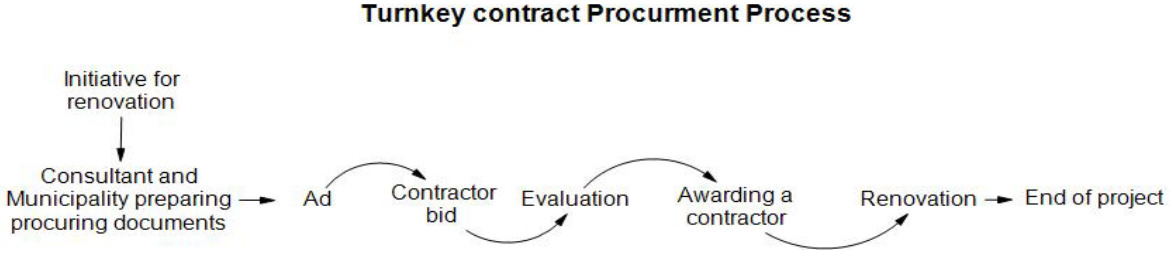
The common practice, when it comes to evaluating bids, has up until recently been done through a competitive tender based on lowest price. In response, the procurement has been a fierce price competition between the constructors (Sorell et al. 2004). This created a situation that led to stronger incentives for contractors to cut corners and produce lower quality buildings (Ibid). It also presents another barrier for the incorporation of energy efficient technology since this is more expensive and often is more time consuming. However, by using economically most beneficial for tender evaluation you can change this and put less value on price and more value on quality. In this study all project had moved from using lowest price to most economically beneficial tender. Still some clients put more weight on price but the tendency seems to be that the clients are starting to include more quality and environmental aspects in the procurement. Energy efficiency is yet to be included but if suppliers have to improve their performance in this area, it will lead to innovations in the industry.

Clients using turnkey contracts perceived it as difficult to include energy efficiency measures in the evaluation criteria and were not sure of how to do it. One expressed it as difficult to evaluate energy consumption due to contractors using different evaluation models. Therefore it could be beneficial to create standardized modelling software that all contractors that want to submit a bid would use. It also seemed to be some thoughts about the procurement laws and what is allowed and not when it comes to energy efficiency. Therefore some information campaign or workshops on energy efficient procurement would be beneficial to show in what ways the clients can include these issues.

5.2.4 Building organisation process and contracts

The organisations primarily used two types of contracts in the procurement process, turnkey and partnering. These two contracts lead to different ways of organising the projects. The turnkey procurement process can be seen in figure 3. It shows a linear process where the project ends without an evaluation and when a new project starts it goes through the whole process again. In this way organisational learning is not promoted. When making an evaluation you allow the organisation to collect and process data and learn from this. Dixon (1999:1) writes that "*knowledge is the result of learning*". Hence, if the evaluation is not a part of the process you will not develop new knowledge that can later be transferred into the next process. A similar conclusion was drawn by Sorell et al. (2004) where he found that the clients often used the same procurement documents over and over again without much change. This comes back to the "this is the way we have always done it" attitude, which hinder innovation and progression in the industry since new technology and new ideas will not be promoted.

Figure 3 Turnkey contract procurement process



It was argued that interaction between the parties in the process is infrequent which Sorell et al (2004) also concluded. Consultants make their drawings and then the constructors come in and execute without much interaction. Since they have different specialisations it often leads to solutions that are not optimal from a quality or efficiency perspective. In addition, if the client does not include energy efficient measures in the procurement documents it cannot be integrated later on in the process. Hence, the linear (see figure 4) and fragmented process that comes out of a turnkey contract presents a major barrier to both energy efficient measures and organisational learning in all the involved parties' organisations.

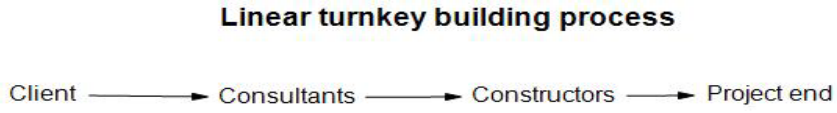
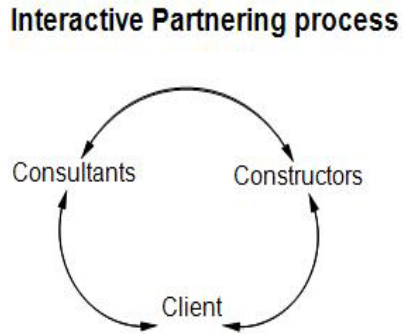


Figure 4 Linear turnkey building process



Nässen et al (2008), Sorell et al (2004) and Smeds and Wall (2006) argued that in order to construct energy efficient buildings an integrative approach is needed. Strategic partnering was executed by two of the clients in order to solve the problems with losing knowledge as well as creating a more integrative process. It was evident that the projects using partnering worked much more close with consultants and contractors during the process (fig 5). Regular meetings are held and the contractors and consultants work together to find optimal solutions.

Figure 5 Interactive partnering process

Also since the constructors have options on the next project an evaluation is carried out when a project is finished before a new contract is signed (fig 6). This enables both the client and contractor to learn and do a better job the next time. It creates a supportive environment that allows continuous improvement (fig 6).

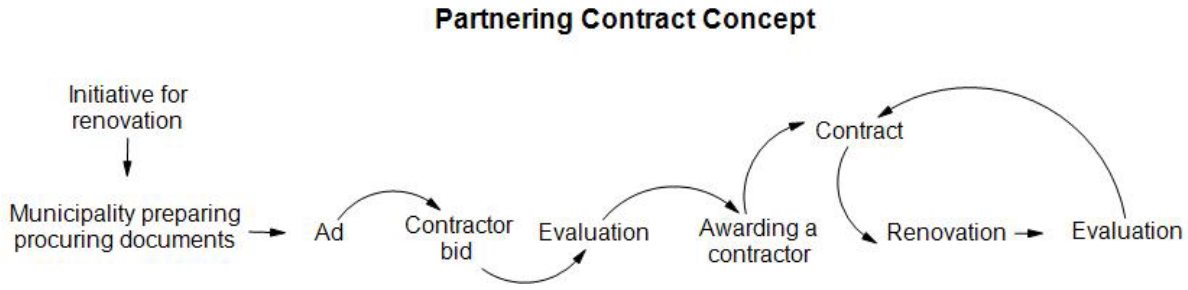


Figure 6 Partnering contract

In conclusion, a turkey contract put more pressure on the municipality to produce good material and have good knowledge in how to procure the services since you cannot change it later on. Hence, the structure of the turnkey contract and the following building organisation have been and still is a major issue in the building sector which is also apparent in renovations. Partnering on the other hand is more flexible and has an evaluation mechanism built into it since the same team has the option to work on many projects.

5.3 Organising for Innovation

This study has shown that the linear, fragmented process the building industry is organised around is very inefficient for encouraging innovation in the industry. The capacity of the different parties in the process in not fully utilised because of the lack of interaction. In addition, valuable knowledge is lost in the end of projects since evaluations are not carried out.

Exton and Totterdill (2009) argue that old ways of organising and managing work is not adequate for delivering the adaptability and innovation that is needed.

> "There are no blueprints or easy paths to sustainable organisational innovations. Sustainable change is messy and uncertain, involving the painstaking engagement of all stakeholders in a process of gradual learning, dialogue, experimentation, and trial and error." (Ibid. 3)

Sustainable change is based on long-term innovation rather then short-term cost cutting measures (Ibid). Partnering in many ways enables this. The engagement and interaction between the different actors in the process is something that has been expressed as very valuable since it allows both the clients to increase their knowledge as well as the consultants and constructors to come up with new ideas. A great deal of time is spent in meetings with all parties to uphold a good dialogue through the entire process. It is time consuming but necessary to get a well executed project. Further, when a project is completed, evaluations are made in order to improve before the next project is started. The fact that many projects are procured in one also enables the involved parties to think in more long-term perspectives instead of the short-term profit maximisation that is currently the norm. When integration, cooperation and evaluation are carried out in a good way it creates an enabling environment for innovation. From this study it can be concluded that partnering seems to incorporate many of these aspects if executed in the right way.

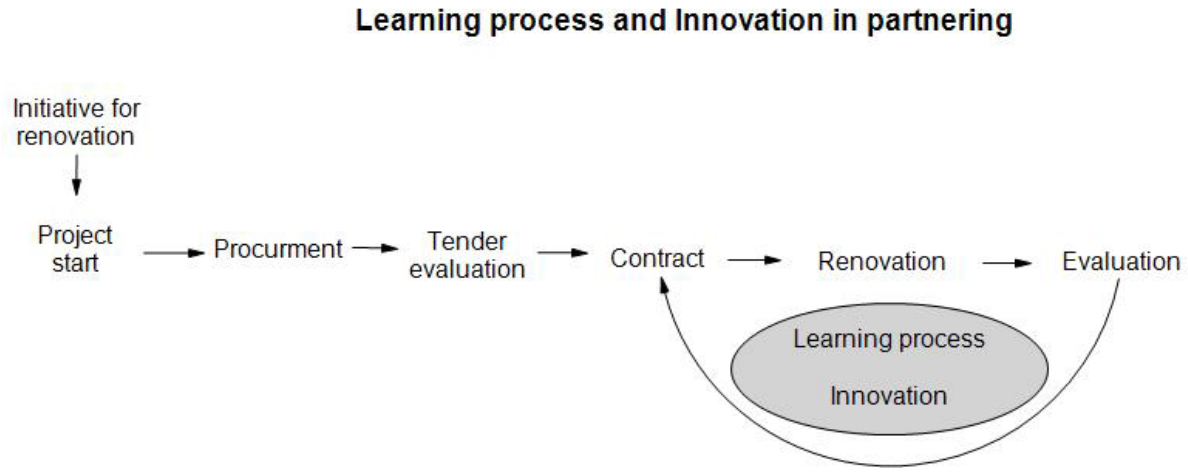


Figure 7 Learning process and Innovation in the partnering process

6 Discussion

It has been a great experiences working with this study. To be able to talk to practitioners about how they perceive the problems and get a better understanding of these issues has been informative. This section will discuss the following questions:

- Was the purpose and aim of the study fulfilled?
- Did the research bring out expected answers?
- What would be done if it was possible to re-do the research?
- Has the study raised new questions for further research?

The purpose of the study was to increasing the understanding of the procurement and building process from the perspective of including energy efficiency in renovations. Even if the study does not capture the entire picture of the topic, initial analysis has been carried out and subjects for further discussion have been raised. By this I perceive to have fulfilled my purpose. Further, the outcome of the result is in line with earlier research conducted on the procurement and building processes of new buildings. This indicates that renovation procedures are similar to the procurement and organisation of new buildings which opens up for the possibility of learning from and applying these procedures into the context of renovations. Nevertheless, the analysis of the result has contributed with some new insights and explored the concept of strategic partnering. It seems like partnering is a promising way of organising for energy efficiency and innovation in the building sector. Overall it is perceived that the study has contributed with:

- Facilitating an understanding of how energy efficiency can be and currently is incorporated in the procurement process and building organisation
- Acknowledging and addressing the current barriers to energy efficiency in the municipal sector when it comes to procurement and building organisation
- Exploring the concept of strategic partnering and its advantages and disadvantages

The method was carried out as planned without any major problems. However, one issue was the fact that the interviewees seemed to want to give the "right" answer without having the knowledge about the subject. This could lead to difficulties in interpreting the results, however, I have tried my best to give a fair picture by being considerate of how this phenomenon might have influenced the outcome. The study would have benefited from more respondents especially from clients that used turnkey contract for renovation. Therefore, if doing the research again an initial client survey would be done. This in order to establish some general conclusions about client knowledge and thought of the conceptualisation of energy efficiency and the inclusion of it in the procurement process. Likewise, more in-depth interviews with, if possible turnkey projects, would have strengthened the validity and reliability of the study. Nevertheless, even if no definite or generalizable conclusions can be drawn from this study it has contributed to the area by identifying and discussing ideas on how to deal with energy efficiency in the procurement and exploring new organisational structures for discussion.

Further research

It is evident that this study has evoked a lot of questions and that a lot of issues remain before the incorporation of energy efficiency is seen as self-evident in the procurement and renovation.

Especially, it has been brought forward that existing policy arrangements, organisational routines and socio-technical structures present obstacles to energy efficient innovations in the building

industry. The procurement laws make it difficult for clients to incorporate energy efficient measures especially when it comes to including emission reductions in the procurement process.

In line with this the existing legal framework for procurement should be addressed and analysed to identify barriers and solutions to the inclusion of emission reductions from a policy level. In addition, it should be discussed which policy tools would be most effective in realising the inclusion of energy efficiency in renovations. Further, the issue of environmental marginalisation due to free market regulations should be raised.

On the micro level, knowledge barriers and their implications on the inclusion of environmental aspects in procurement should further be investigated, analysed and discussed. Also what tools and methods, such as life cycle cost calculations, can be used by organisations to bring in a more long-term financial perspective should be addressed both from a client and constructor perspective.

In the end, by continuing the research in this area it will hopefully bring about change in the procurement practices and move it towards more sustainable trajectories.

7 Conclusion

To provide more resource effective and sustainable houses as well as achieving the goal of reducing energy consumption in buildings with 50 percent by 2050, it is crucial to include energy efficient measures in renovations. Therefore, the purpose of this study was to increase the understanding of how energy efficiency can be incorporated in the public procurement and building organisation processes in relation to the renovation phase.

A multiple case study approach was used, comparing four municipal renovation projects. Documents related to the procurement were compared and analysed and semi-structured interviews were carried out - enabling both a technical and organisational analysis of the topic. The limitations were the limited number of respondents especially when it comes to turnkey contracts. Yet, in relation to the purpose of the study the collected data was considered to be substantial enough to make initial analysis and to bring up subjects for discussion.

The results and analysis showed that there are two main ways of including energy efficiency in the procurement process: either through the qualification criteria specifying all measures or weighting it in the evaluation. It was concluded that energy efficiency is currently not being incorporated in the procurement to a large extent but that all clients had joined an energy challenge to reduce energy consumption. This seems to indicate that energy is increasingly becoming recognised and further incorporated into the procurement and organisation processes.

The barriers to the inclusion of energy efficiency in the procurement process were found to be:

- Knowledge
- Financial constraints and a short-term time perspective
- Evaluation criteria
- Building organisation and contractual issues

A few solutions that were brought up included information sharing regarding both technical aspects and evaluation criteria provide incentives for investments and organising the building process differently. Creating a software model for evaluation of energy efficiency was also discussed as well as partnering. Partnering was argued to be one of the best ways to include energy efficiency and to enable innovation and learning processes in all the involved organisations.

In the end, it is my hope that by conducting this study, I have highlighted some issues that can be further studied and discussed to enable procurement practices to move towards more sustainable trajectories.

References

BBR (2007), Building Regulations-Mandatory provisions and general recommendations, energy management. BBR 2006:22

Bryman, (2004), *Social Research Methods*, Oxford: Oxford University Press

Hjern, B. & Andersson, U-C. (1998) *För vem studier: Rygg och Nacke.(eng: for whom-studies: back and neck")* Retrieved 2008-03-19 from: http://www.socsam.finspong.se/dokumentarkiv/rapporter/rapporter_rygg_nacke.htm

Dixon, N. M. (1999) *Organisational Learning Cycle: How we can learn collectively* Gower Publishing Limited: Brookfield [Electronical Resource]

Exton. R, and Totterdill. P, (2009), Workplace innovation: Bridging knowledge and practice. *AI & society*. Vol 23, No 1.

Joelsson, A. and Gustavsson, L. (2007) Perspectives on implementing energy efficiency in existing Swedish detached houses, Energy Policy vol: 36 p: 84–96

Kates. R.W, Clark. W.C, Corell. R, Hall. H, Jaeger. C. C, Lowe. I, James. J, McCarthy, Schellnhuber. J. H, Bolin. B, Dickson, N. M, Faucheux. S, Gallopin. G. C, Grübler. A, Huntley. B, Jäger. J, Jodha. N.S, Kasperson. R.E, Mabogunje. A, Matson. P, Mooney. H, Moore III. B, O'Riodan. T, Svedin. U, (2001) Environment and development: Sustainability Science, *Science magazine* Vol 292, No 5517

KBAB, (2009) *Fasadrenovering Orrholmen, (renovating fasadec Orrholmen)* Retrieved 2009-04-21 from: http://www.kbab.se/Templates/Article0.aspx?PageID=59fceb6e-2969-45a3-bf4e-5670f271d965

KBAB, (2007), *KBAB har eldat sista oljedroppen (eng: no more oil for KBAB).* Retrieved 2009-04-28 from: http://www.kbab.se/Templates/News1.aspx?PageID=99dd8083-f914-421c-844f-147376674dbd

KBAB, (2004), *Anbudsförfrågan "Fler projekt i ett" (eng: administrative documents, many projects in one).* Retrieved 2009-05-06 from G.Persson during interview

Miljöaktuellt, 2009, *Leverantörer: "Ställ tuffare miljökrav vid upphandling" (eng: Suppliers: we want higher environmental demands in procurment).* Retrieved 2009-02-18

Moses and Knutsen (2007), *Ways of knowing- Competing methodologies in social and political research*, Houndmills: Palgrave Macmillan.

Nässen, J., Sprei, F. and Holmberg, J. (2008) Stagnating energy efficiency in the Swedish building sector—Economic and organisational explanations. *Energy Policy*, Vol. 36, P.3814-3822

Pedersen, K. (2008), *Upphandlingens grunder- en introduction till offentlig upphandling och upphandling I försörjningssektorerna (eng: an introduction to public procurement*). Jure förlag, Stockholm

Regeringskansliet (2006), *"Nationellt program för energieffektivisering och energismart byggande" (eng: national program for building energyefficient and energyintelligent),* Retrieved 2008-12-17 from: http://www.regeringen.se/content/1/c6/06/07/74/ffa4e648.pdf

SABO, (2009), *Anslutna företag (eng: affiliated companies).* Retrieved 2009-05-14 from: http://www.sabo.se/kunskapsomraden/miljo_och_energi/skaneinitiativet/Sidor/Anslutna.aspx

SABO, (2009a), *Oppositionspartierna presenterar nytt ROT-avdrag*, (*The opposition is presentning a new tax decuction)* Retrived 2009-05-23 from: http://www.sabo.se/aktuellt/nyheter_s/2009/april/Sidor/nyttROT_avdrag.aspx

SEA (Swedish Energy Agency), (2007) *Energiläget 2007 (eng trans: energy assessment 2007*) retrieved 2008-12-02 from: http://www.swedishenergyagency.se/web/biblshop.nsf/FilAtkomst/ET2007_49.pdf/$FILE/ET2007_49.pdf?OpenElement

SEA (Swedish Energy Agency), (2005) *Energiindikatorer (eng trans: energy indicators)* Retrieved 2008-09-02 from: http://www.swedishenergyagency.se/web/biblshop.nsf/FilAtkomst/ET2005_20.pdf/$FILE/ET2005_20.pdf?OpenElement

Sorrell S., O'malley E., Schleich J., and Scott S., (2004) *The economics of energy efficiency- barriers to cost effective investments,* Edward Elgar, Cheltenham

Strauss, A. & Corbin, J.M. (1998) *Basics of Qualitative Research Techniques and Procedures for Developing Grounded Theory*. Sage:Thousands Oaks, Calif.

Svenning, C. (2003) *Metodboken*. Eslöv: Lorentz Förlag.

Yin (2002), *Case study research: design and methods- third edition*, London: Sage

Varnäs, A., (2008), "*Enhancing environmental performance by green procurement- a study of environmental procurment preferences in the construction industry",* Licentiate Thesis, KTH, Stockholm

Vätterhem, (2007). *Administrativa föreskrifter (administrative documents).* Retrieved 2009-03-18 from H. Möller during interview

Ängelholmshem, (2008). *Administrativa föreskrifter AMA AF 07 (administrative documents).* Retrieved 2009-03-25 from P. Henrysson during interview

Appendices

Appendix A - Interviewees

Alingsåshem - Brogården

Bengt Josefsson, executive director (swe: fastighetsförvaltare)

Phone no: 0322- 61 77 26

Karlstad- Orrholmen

Gunnar Persson, strategic coordinator (swe: strategisk koordinator)

Phone no: 054-14 28 37

Vätterhem- Råslätt

Henrik Möller, executive director (swe: byggchef)

Phone no: 036- 19 94 31

Ängelholmshem - Sockerbruket

Per Henrysson, executive director (swe: fastighetsförvaltare)

Phone no: 0431- 44 99 63

Appendix B KBAB quality and evaluation criteria

Quality criteria	Content of criteria	% weight Project type 1 2
A. Organisation	• Total quality management • Corporate philosophy • Administrative structure • Corporate flexibility	Consultant 15 25 Constructor 30 35
B. Competence	• Ability A) Creativity in problem solving B) Efficiency C) Sense for aesthetics D) Manual skills E) Low margin of error F) Engagement in problem solving G) Sense of reasonableness of the objective so that obvious errors are not built in • Knowledge A) Familiarity in the projects nature B) Knowledge of relevant laws C) Holistic knowledge in building operations, environmental issue, economy, function D) "KBAB- building book competence" E) Feeling of time requirements F) Clearness in contracts and documents G) Quality and responsibility in the delivery phase • Ability to communicate with all concerned parties • Ability to coordinate A) Ability to coordinate so that no contrarious actions are taken B) Planning and coordination ability of work and deliveries	Consultant 60 45 Constructor 45 35
C. Cooperation	• Commitment to the project A) Comprehensible dialogue B) Loyalty • Respect for the individual A) Availability and punctuality • Social competence A) Sensitivity and personal chemistry B) Team building skills	Consultant 25 30 Constructor 25 30

Quality parameters	Evaluation criteria
A. Quality and Environmental management	How well is the quality and environmental management systems adapted to partnering? Degree of applicability of the management systems to carry out the needed quality and environmental work during the pre-study, planning, construction and during the warranty period
B. Project organisation	Degree of insight of what is demanded from the participants from pre-study to operation Degree of experience and knowledge of building projects with emphasis on the personal skills needed for a partnering project
C. Competence, building process	Degree of insight, strengthened with concrete examples of how the quality in the building process is ensured in behaviour as well as production and quality of tendering projects that will be produced within these areas
D. Competence, critical business areas	Degree of insight of how the different areas is affecting the affordableness of the projects, with emphasis on the needs of long-term operational management, as well as the quality of the projects that will be tendered within these areas
E. References	**Questions regarding competence to references** -What is your opinion of the mentioned organisations competence - Are they successful problem solvers? - Are they dependent on one person? - Are they price, quality and environmentally conscious - What is your opinion on the efficiency of the organisation - To what extent do they have a sense of aesthetics - How knowledgeable are they of the relevant legal frameworks - What is your opinion of the organisations logistics and cooperation ability **Questions regarding cooperation** - What is your opinion on the organisations social competence - does the organisation have good management skills -Sensitivity: is the client and consultants ideas interpreted right? - Conception of time: do they respect other peoples time?