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## **To renovate or not to renovate-**

A study of how housing companies are managing their housing stock

Master's thesis in Design and Construction Project Management

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Department of Architecture and Civil Engineering  
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CHALMERS UNIVERSITY OF TECHNOLOGY  
Master's Thesis BOMX02-17-56  
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Rendering of a local area in Gothenburg

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### **Abstract**

The following report analyses how the public housing companies of Sweden are managing the aging building stock and what effects these strategies have. The aim was also to map out a “best practice” among the housing companies analysed. To be able to provide an extensive study, a combination of interviews and case studies have been carried out on three public housing companies that are the biggest in Gothenburg: Poseidon, Bostadsbolaget and Familjebostäder. Besides from the interviews, the case studies have been strengthened by analysing the company's annual report to see what ambitions they have when considering sustainability factors.

In the results, it was found that all three companies work differently, Familjebostäder and Poseidon work with individual buildings while Bostadsbolaget has a more holistic approach when it comes to maintaining their properties. The holistic approach is considered to have less negative social impacts than working with the individual buildings that results in higher rent increases as could be seen in the case studies. Public housing companies should establish a strategic maintenance approach in a similar way to Bostadsbolaget to avoid the negative effects of renovation when maintenance is delayed. A good communication with the tenants at an early stage and allowing them to feel that they have control over what is going to happen with their homes is recommended.

**Key words: renovations, public housing companies, maintenance planning, best practice**



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# 1. Introduction

## 1.1 Background

“As wave is driven by wave  
And each, pursued, pursues the wave ahead,  
So time flies on and follows, flies, and follows,  
Always, for ever and new. What was before  
Is left behind; what never was is now;  
And every passing moment is renewed.”

- *Publius Ovidius Naso, Metamorphoses, 8 AD*

The realisation and acceptance of renewal was known even in 8 AD by the great Ovid. Renewal is a natural process as was cited by Ovidius, but this is not 8 AD and the time of Ovid! We can however draw an important parallel to our existing and aging built environment. Since renewal is natural with time; it is only natural that renewal is also expected in the housing stock.

Due to the industrial revolution, the building stock increased rapidly during 1950-1975 in the developed countries. In Sweden, the Million homes programme, close to 1.4 million homes were built in the interval of 1961-1975. 600 000 of the 830 000 multi-family dwellings await very costly renovation measures, however “a large part” of these buildings need maintenance and “cautious renewal” (Formas, 2012, pp. 21).

This aging building stock needs restoration due to service lives of buildings not being infinite. The buildings from this period are also great consumers of energy and in general, buildings account for about 40% of the final energy consumption worldwide and responsible for about 33% of the overall CO2 emissions (SOU, 2017). Therefore, politicians in Sweden see a great potential in combining the renovations of the technical equipment together with energy saving measures. However, one question remains: Who’s responsibility is it to carry out these costly renovations and is it fair that in all the cases, the tenants must pay for these measures directly or indirectly? One of the criteria for renovations to be sustainable, was to ensure that the tenants can continue to live in their homes even after renovations (Peter Eriksson, 2017), which is not the case today.

A general perception of the million homes programme is *monotonous high-rise buildings, concrete blocks and problematic areas*, but this is not the definite case when viewing the full picture (Formas, 2012). The most common building type is dwellings of three floors with a saddle roof and brick facades. Most of these buildings are approaching their “40-year old crisis” where the piping network needs to be replaced, certain building parts maintained/restored and finally, alterations required to meet new accessibility requirements. However, these measures depend on how these houses were built and maintained over the years. For a renewal to be sustainable, consideration should be taken to actual conditions of the housing and the areas, the history and the people that live there. (Formas, 2012)

In real estate, maintenance is commonly postponed for several years to reduce costs for private housing companies or reduce public spending (Christen et al., 2013) even if proper maintenance is regulated by law (12:15 1<sup>st</sup> paragraph Swedish Land Legislation) as a tenant right. However, it is not clear-cut what the tenant should expect in maintenance measures. Often there is a



distinction made between maintenance being *restoration* of an existing function and investment being *improvement* to an existing building (Lind and Muyingo, 2011). Due to the postponed maintenance, some buildings are in a very bad state and in need of vast measures for the well-being of the tenant, but as reported by Formas (2012, pp. 268), “these are very few”.

While renovation is necessary in some cases, there is a difficulty to recognise good methods to achieve sustainable results, where the economic, social and environmental pillars are in balance. Just as Thuvander et al. (2012) state, there is a need for a simplified methodology for renovation that should be developed with references to other tools that can evaluate the more intangible values of the dwelling. The authors recognise the lack of routines and policies focusing on renovation processes even after considering the fact that about 56% of all investments in housing in Sweden are related to renovation activities. The authors state that the construction industry still aims to achieve sustainable new buildings, overlooking the potential in the aging building stock, however there has been some growing attention to the existing dwellings recently. Since there is a lack of knowledge of the qualities and the state of the existing building, there is also a risk to oversee intangible values, such as replacing high quality materials with industrial products with a shorter lifetime (Thuvander et al., 2012). This implies that more than necessary measures are taken sometimes.

Long-term property managers are facing the increased difficulty of how to manage the aging building stock in a way that is sustainable both for the company’s survival and the tenant’s ability to stay in their apartment after restoration takes place. Therefore, an attempt is made to analyse how different housing companies in Sweden are working with their buildings to be able to identify a company working with "best practice"- like methods.

## 1.2 Aim

Can a “best practice” maintenance planning be recognised among the Swedish housing companies that is sustainable for both the housing company and the tenant? Further, what are the effects of the strategies being used by the housing companies?

### 1.2.1 Research questions

To answer the aim, the following specific research questions have been used in this study:

- a) How is maintenance planned by the housing companies and how much is it used by them?
- b) Do the housing companies consider social effects of their maintenance strategies and how do they work with these?
- c) How is renovation planned within the maintenance plan by the housing companies?

### 1.2.2 Delimitations

- Risks with renovations such as company bankruptcy and quality of renovations differing are not discussed in this essay but the authors are aware of these issues existing
- Environmental aspects considered in this report is the energy usage and how this is affected by renovations/maintenance in the form of energy retrofitting

- Million program homes are analysed in the report due to most of them located in suburban areas with poorer households and are more segregated. These buildings are also in most need of renovations usually due to delayed maintenance.
- This essay focuses on three public housing companies in Gothenburg for simplicity but the authors are aware of challenges in trying to represent all housing companies by analysing only these.

## 2. Literature review

The literature review is structured in the following way: introduction of public housing companies in Sweden, distinctions between renovations and maintenance and finally incentives for the both.

### 2.1 Public Housing companies

Public housing companies (Allmännyttiga Bostadsföretag) in Sweden are owned by the municipalities and have the aim to provide sustainable and affordable housing for everyone (Allmännyttan, 2017). The board consists of politically affiliated representatives selected to represent the public homes of the municipalities. The amount of influence that the board members have varies depending on their interests. In the figure below, the organisational structure is illustrated of how a typical housing company governance may look like:

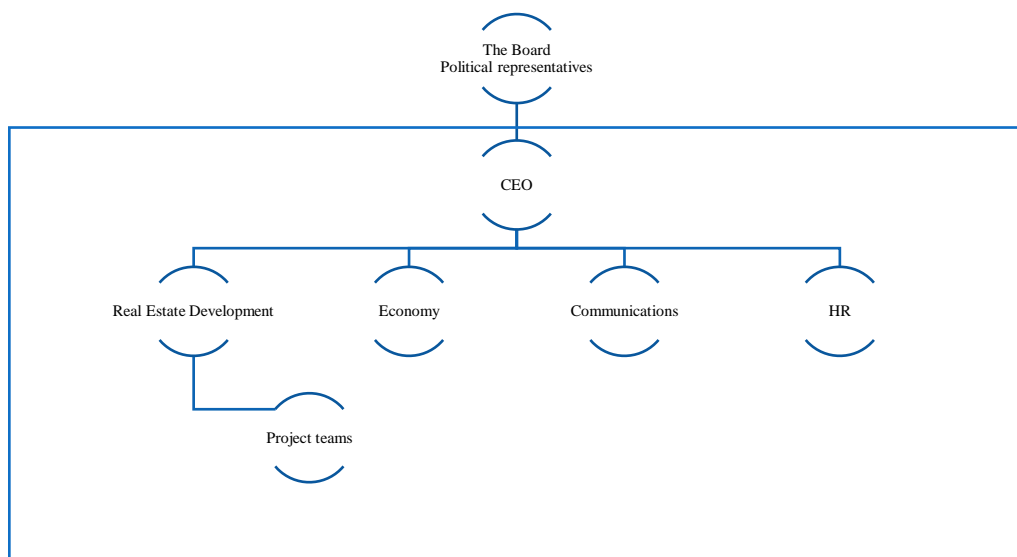


Figure 1. Organisational structure of a typical public housing company, own figure from Allmännyttan (2017)

What strategies the housing company will have for managing their property portfolio, depends on how much influence the Board has and what the political incentives are (SABO, 2016). The housing companies are different, both with their building portfolio and economy and can therefore be divided into three ambition levels: the short-term profitable, the “little extra” company and the very ambitious company (Lind, H. & Högberg, L., 2011).

The short-term profit maximizing company are driven by economic incentives. When this type of company investigates the investment possibilities, energy efficiency measures are treated as other investment decisions and are expected to give a higher return than the compared

alternatives. Transactional costs are presented as a barrier to energy efficiency investments for the short-term profitable company. The companies that do the “little extra” add the decreased environmental load to the equation. The economy is a driving force but these companies have a larger perspective when they view investment possibilities. The ambitious company, the smallest category, give priority to energy efficiency and have very ambitious goals. They carry out extensive measures to decrease energy usage. Some of these companies have a clear political governance structure while others have engaged employees within the company. Profitability is not the most important aspect; it is rather the question of responsibility that is more important for the ambitious company.

## 2.2 Property Management

In the increasing debate of how to manage the aging building stock of Sweden, renovation has become the standard, driven by some housing companies chasing cost benefits of energy savings while private companies are trying to drive up the market prices of their properties to be able to sell them off at a higher price (SABO, 2009). The housing companies should form strategies for their building stock based on an assessment of each building since what can be done differs depending on the area. In these strategies, new building, maintenance, refurbishments, selling off and demolition should be considered (SABO, 2009).

### 2.2.1 Definitions of renovation and maintenance

The term “renovation” has no definite meaning within the construction industry and the word can be interpreted differently depending on the situation. At most times, renovations mean measures or arrangements to increase the quality of the object to make it comparable to a new object of the same nature (Bodin, A., 2015). Other terms that are used almost synonymously with renovation is alteration, adaptation, rehabilitation, refurbishment, retrofitting, restoration, reconstruction, retro-commissioning, modernization, transformation and so on (Thuvander et al., 2012). The Swedish Planning and Building Act published in 2011 uses a more general term for renovation, namely alteration. Alterations include both changes and new additions to an existing building, however there are no clear limits between alterations or maintenance.

Maintenance is an important judicial concept since tenants have the right that the housing company maintains the facility without it affecting the rent level. A distinction is made by Lind (2015), between maintenance and investment. Maintenance is defined as measures that restores the original quality of the building/apartment and such measures include re-painting and replacing old pipes with new. If an increase in the quality of the apartment has been done compared to when it was new, an *investment* has been made and the standard of the apartment increases. In Sweden, AFF04 is used for defining maintenance classifications and EN13306 is the European standard (illustrated below). The difference between the two is that AFF04 assumes that the technical functions are deteriorating and that maintenance is carried out to restore the original function whereas EN13306 covers “actions intended to retain in a functional state” in the definition of maintenance (Muyingo, 2009).

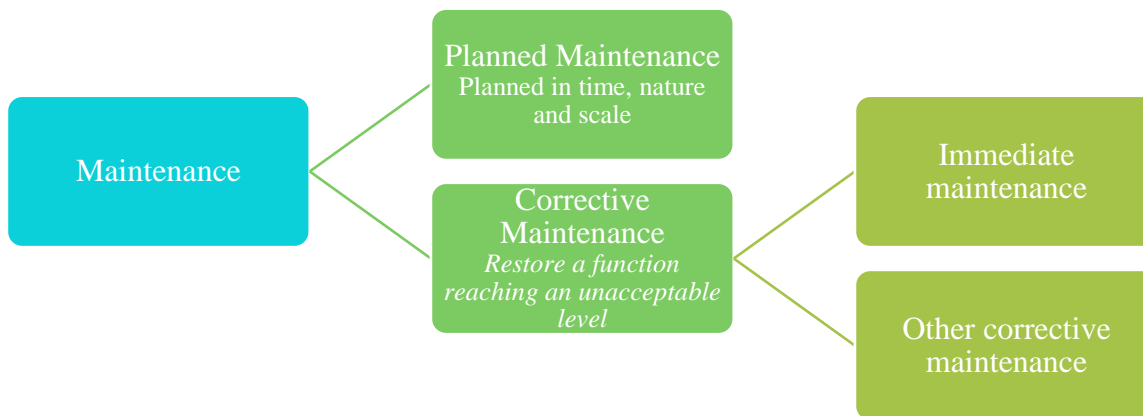


Figure 2. Maintenance in AFF 04 (own figure)

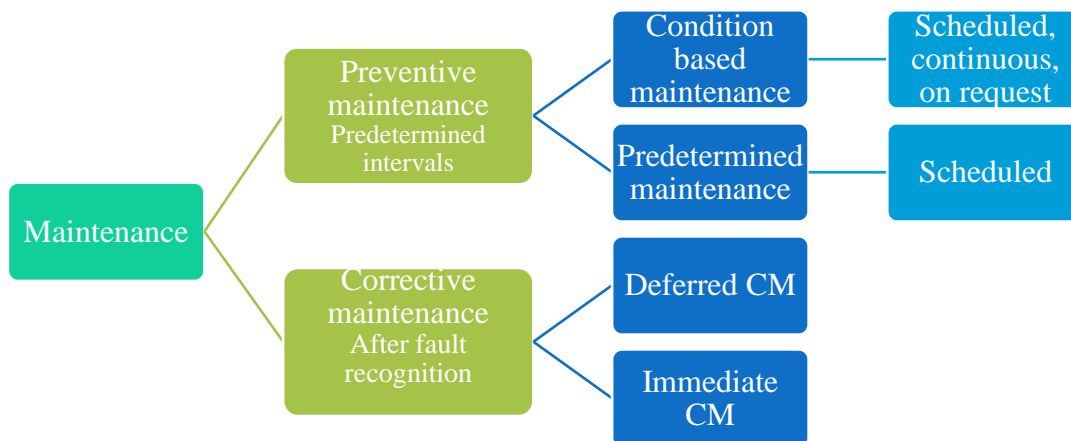


Figure 3. Maintenance in EN 13306 (own figure)

Corrective maintenance is the classical maintenance policy where an item is used until it breaks/faulty requiring a reparation and servicing of parts. Preventive (planned) maintenance refers to cases where reparations/replacements take place without any specific faults. As the name suggests, the plan with this method is to prevent future failures and presumably higher costs in the future (Lind and Muyingo, 2012). From these maintenance classifications, renovations can be included within the actions required in maintenance plans.

### 2.2.2 Building Maintenance

Already in the beginning of the millennium, the need for maintenance was strong in the public housing buildings in line with the report by BBR (2003) *Check out Maintenance (Bättre Koll på Underhåll)* since these had delayed their maintenance for the past decade. This has been attributed to the crisis in the 90's where many of the public housing companies had vacant apartments and no ability to deposit funds for maintenance. During this period, many apartments were demolished but many more needed to be demolished due to the housing surplus (Boverket, 2003). However, very few of these apartments needed to be demolished or drastically renovated, even if the maintenance has been delayed (Formas, 2012) implying that they are of a good technical standard.

In the bigger cities of Sweden (Stockholm, Gothenburg and Malmö), the suburbs of the cities are typically with residents of lower income and a non-Swedish background. These “vulnerable” areas are pointed out as areas which need to be given more attention to increase the attractiveness. Since there is a grave housing shortage, there is no problem to finance the maintenance (Boverket, 2003). This also results in the property owners to be less tolerant to tenants that cannot pay timely rents or that are “troublesome” meaning that this “troublesome” group have been pushed to certain areas and housing companies, increasing the segregation and the risk for delayed maintenance. Maintenance in Sweden is the responsibility of the owner and shall continue to be so, thus bringing upon the responsibility of knowledge build-up and transfers revolving maintenance. The current low level of maintenance today leads to necessary maintenance measures to push aside other urgent standard increasing investments. Consequently, the already less attractive areas are in risk of becoming even less attractive (Boverket, 2003).

Moubray (1997) divides maintenance up into three generations:

- a) “Fix it when it broke”-mentality before WWII
- b) Development of preventive maintenance between 1950-late 1970’s
- c) Condition-based maintenance approach to the present

To select an appropriate maintenance strategy, it is necessary to determine the maintenance requirement of the assets in the operating context and then make the decision of what resources are needed to fulfil these requirements (Lind and Muyingo, 2012).

Usually, there are several strategic options for maintenance of buildings and there are many alternative decisions to be considered. For instance, the opportunity to reduce demands for maintenance by addressing the actual causes of failure and identification of its consequences; it may be necessary to decide whether to repair or replace items. Maintenance strategies can be divided into several specific types. In Sweden, AFF 04 is used and Europe uses EN 13306 to develop maintenance strategies, which were defined above in 2.2.1. Swedish studies show that property managers make three to five-year maintenance plans but do not follow them for more than a few months (Muyingo 2009).

### 2.2.3 Renovation

There is no one perfect strategy for renovations since the nature of buildings vary in form, size and technical function. It depends more on the owner objectives and on the asset value and competitiveness. The identification of the property performance, reduction and retrofit opportunities will help to look forward on refurbishment strategies. The budget for the refurbishment project should encompass the ability to meet the required outcome, getting enhanced rent incomes and reduce operating cost. The time frame of the refurbishment projects will have a significant impact on the budget and the refurbishment strategy should be an effective way of managing cost with exact time within the capital expenditure. (Shah, 2012)

Renovation processes are complex when considering decision-making, planning as well as execution compared to the process of new construction that usually has standardised procedures and instruments (Thuvander et al., 2012). Below in figure 4, the general renovation framework by Boverket is presented showing the standard process of renovation.

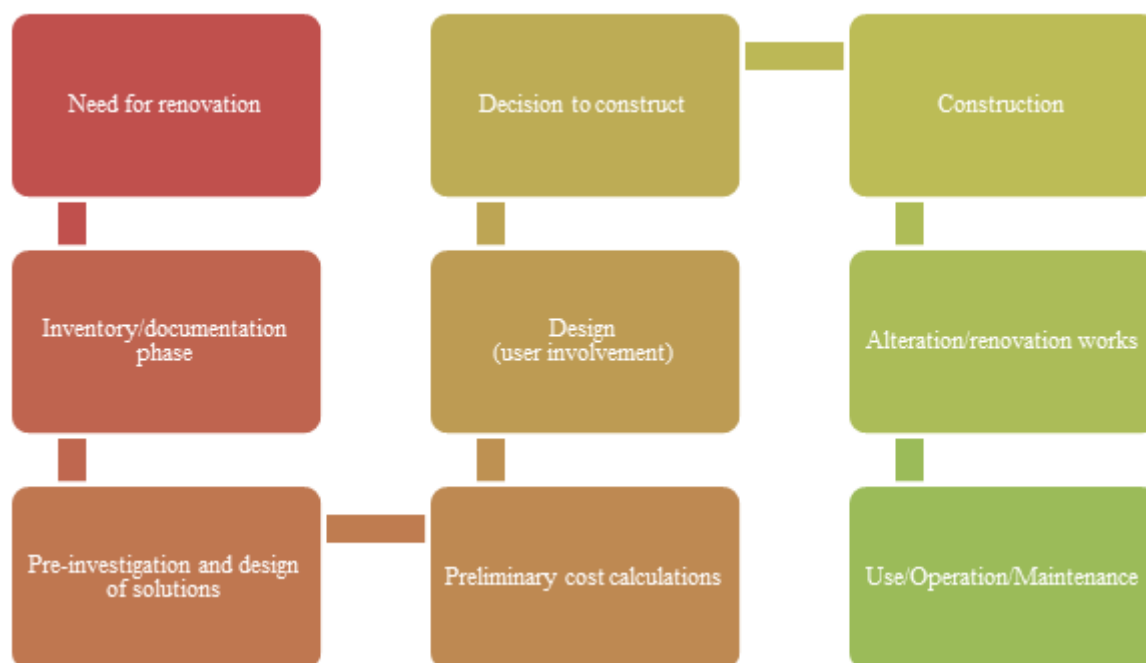


Figure 4. The renovation process, own figure

The renovation approaches used in the Swedish housing market vary between the housing companies, however Thuvander et al. (2012) have conducted a study in which they invited property owners/managers, architects and construction companies to a workshop focusing on the preliminary investigation stage and the level of detail that is sought after in practice. The aim was to map the renovation process, gather information about preliminary investigations, evaluations of options as well as find out the decision-making on actions. Tools used in the preliminary investigation phase included life cycle cost calculations (LCC), market analyses, cash flow projections, discounting measures and lastly, “gut feelings” based on professional experience.

It was found that a decision to start an investigation begins at management level, depending on the level of renovation and are usually dependent on the age of the building, technical component performance, high costs (but the property owners highlighted the limited range of potential options due to regulations governing accessibility), energy use, rent levels, as well as tenants’ approval. Municipal housing companies also must conform to local policies, urban development plans and land allocation agreements (Thuvander et al., 2012). The researchers also found that the economy was a central topic especially for public housing companies since it is not possible to establish a maintenance fund such as tenant-owned housing. Also, tenant involvement is recognised as a success-factor since rental property managers need to receive a minimum of 50% tenant consent prior to actions that will raise the quality of the apartment, which in turn will lead to increased rents for all the tenants in close to all cases (Thuvander et al., 2012). Some thoughts that were brought up included whether it was possible to determine what results the client would like before making decisions and if it was possible to act like a developer by setting a base price with additional selections for an extra cost.

In 2011, a specific Act on Public Utility Municipal Limited Liability Housing Companies requires that these companies should conduct their activities per “business-like” principles

(Bröchner et al., 2013). The companies were from this period and onwards supposed to operate in compliance with commercial principles and expect “normal” requirements for the return on investment capital. Prior to this updated law, large renovation projects by public housing companies included actions to tackle social issues (Thuvander et al., 2012), such as Gårdstensbostäder, that emphasized social sustainability in their renovation plans (Lind, 2008).

The technical characteristics that are required for new buildings are required even for renovated buildings. However, the requirements can vary depending on the extent of the change, the buildings prerequisites, requirements on discretion and prohibition of corruption. It is also noteworthy to add that the requirements are on the changes made to the building. For example, if the property manager wishes to add thermal insulation to the external walls, it can be difficult to fulfil the requirements of a new building, therefore recommended u-values are to be strived after instead. “Strive after” in this case means to “follow the requirements if it can happen at a reasonable cost and does not result in negative consequences for other BBR requirements or organisational requirements.” This means in other words, that the values should not be negatively affected if there is not a specific reason for this to happen. (BBR, 2015)

Common practice amongst property owners is to offer a minimum level of renovation which usually includes a bathroom in combination with the replacement of plumbing systems. Besides this, the tenants get the option of choosing add-on options in the form of midi and maxi. The different levels of renovation “packages” vary between housing companies but in the midi-alternative, the kitchen is renovated. In the maxi-alternative, the addition includes that interior surfaces are improved and the result is a standard comparable to a new-built apartment.

#### *2.2.3.1 Housing company and tenant perception on renovations*

The relation between the housing company and the tenant is an important factor to consider. The housing company has one perspective of what they want and can do with their buildings and the tenants, *the people living there*, might have other perspectives.

#### *Company perspective*

SABO (2009) have listed what different companies of different circumstances should do. There are four different profiles for public housing companies as defined by SABO:

a) The company with a good economy in a strong housing market

Housing companies in this category have certain possibilities to go ahead with a renovation to different levels but should focus on limited and minimal levels. Besides having a good economy, there are potentials to increase the rent levels based on the high demand in the market. The increased net operating income generated by increased rent income and decreased operational costs, lead to room for further renovation possibilities after a few years. The company has the potential to make larger investments in certain areas but must then press measures in other locations. Funding the renovation is not a problem since the company has a good stability and high market values in their property portfolio.

b) The company with a balanced economy in a balanced housing market

The housing company in this category have a weaker net operating income and less capital compared to a) and have therefore somewhat smaller possibilities to fulfil extensive renovations. The rent sensitivity on this market is dependent on the location of the building, but even here, there is a chance to increase the rent income. The company should go for limited renovations but to be able to manage their stock, should use limited renovations in

parts of their stock. A few projects with a higher level of renovation can be made. In these companies, the maintenance costs in relation to the planned measures that direct the rate and strategy for what renovation to go ahead with.

c) The company with a pressed economy in a cost-sensitive housing market

This housing company can do minimal renovations with a small amount of renovations to a somewhat higher level. The cost-sensitivity is relatively large in greater parts of the stock.

d) The company with a weak economy in a trembling housing market

These housing companies are small and can never motivate the costlier renovations since the houses are in the smaller towns of the country with homes that have larger vacancies. These companies can do very limited renovations alternatively should consider demolitions.

### Tenant perspective

There are many differences in how the housing companies manage the renovation process. An important aspect as recognised by several researchers including Westin (2011) and Hurtig (1995) is the ability as a tenant to have influence on the coming renovation of their home. That is why the perception on the renovation is dependent on the level of control the tenant feels that he/she has. For the tenant, the most important question is the cost of living and the possibility to influence this. The second most important question is safety and maintenance (Bengtsson et al., 2007). This is one reason for housing companies to allow tenants to choose what level of renovation they would like to have in their apartment. However, all the levels usually involve some form of rent increase only that this gives the tenant the feeling of control (Lind et al., 2014). For the tenants, the issue is not only that they may have to relocate, it is that many must move from their homes that they have created (Hurtig, 1995). Boverket (2014) highlight that it is profitable for the housing company to allow tenant influence and provide information to the tenants, however, Allen (2000) points out that many companies use tools such as tenant influence to create an illusion of being able to have control of choices.

The tenants react in three different ways when approaching a renovation plan. The first group tries to actively search for information and affect the plan. The second group feel powerless and do nothing because of the worry they feel and finally, the third group do not worry and trust that everything will be alright (Westin, 2011). The first two groups have negative thoughts about the plans, but the first group is trying to do something to affect this, if succeeded, they may feel positive that they were heard or if they fail, the negative feelings will become stronger.

Besides the tenant and company perspective on renovations, there are other aspects to renovations as well that include energy efficiency or create better indoor climate. Below are other aspects to renovations that public housing companies consider or should consider in their renovation plans.



### 2.2.3.2 Energy retrofitting

The million homes were constructed during a period when no energy requirements and technical standards for new buildings existed. The u-values for windows were sometimes three times higher than new building standards. The potential energy savings are great- If the building is completely renovated with the best available technical installations, the energy usage would be less than half today. Most energy savings can be made by exchanging windows and heat recovery by installing for example an FTX-system. Each of these measures have the potential to save 30 kWh per heated floor area. But very few buildings are in actual need of an extensive renovation. Depending on the extent of the renovation and other needs than the energy technical, the renovation can be more or less profitable (Formas, 2012).

In a study including 500 homes in a Gothenburg suburb, drinking water and waste water was extremely high. Consequently, volume-based tax was introduced based on individual usage. As expected, the water consumption decreased drastically. (Formas, 2012)

Figure 5 shows that the energy usage is decreasing and this can have several attributions such as additional insulation or replacement of windows. The figures and low energy cost, decreases the incentive to improve energy efficiency in the housing market (SOU, 2017). The specific energy usage provided by the National Board of Housing (BBR) is expressed in terms of kWh per m<sup>2</sup> and year. The specific energy usage for a building in Gothenburg should be 90 kWh per m<sup>2</sup> and year (Formas, 2012). Some public housing companies do have a much higher energy consumption than allowed and therefore may need to consider measures to decrease these.

The figure below illustrates “Five steps to decrease energy usage”. These are commonly used amongst housing companies today (Formas, 2012).

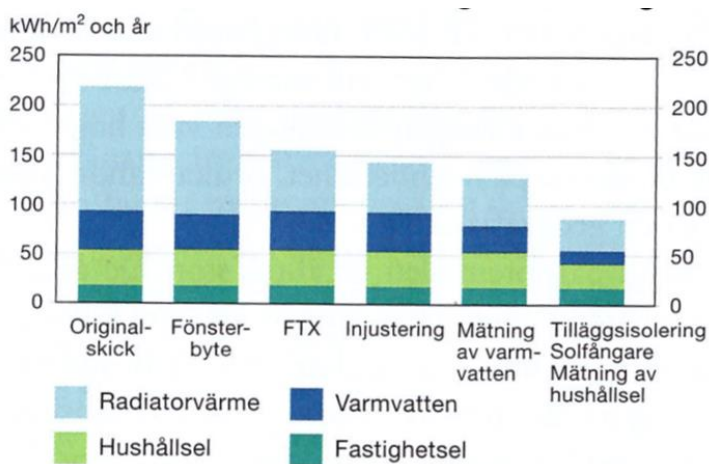


Figure 5. Actions in five steps that can minimize the energy usage from 220 to 90 kWh per m<sup>2</sup> and year, Formas (2012)

Perceiving the renovation from a housing company, a project can be considered as economically sustainable if an acceptable rate of return on invested capital is given. Also, a renovation project is considered sustainable if it does not need internal or external subsidies to finance it (Lind et al. 2014).

Economic effects of renovations are linked to the social or environmental aspects of the action that has taken place. Energy efficiency after renovation of the million homes to the high ambitions that National targets expect, are not as profitable as sometimes perceived. Even if the new buildings follow tough standards and requirements, the already standing buildings are

staged to be where energy savings can be made. If energy usage can be decreased, the energy bills can be decreased too right? What are the housing companies waiting for? There are several different incentives to invest (or not) in energy efficiency. According to Lind, H. & Högberg, L. (2011), three driving forces can be recognised: political, economic and ethical incentives.

The political incentives include the requirements that the housing company need to conform to, foremost to the National Board of Housing (BBR) norms. Economic incentives include the factor that public housing companies need to be profitable and act in a business-like way to compete on the same level as the private housing market. Energy costs usually take a larger chunk of the company's operational budget. If these costs can be decreased, the company net operating costs will get better and keep the rent levels down. How profitable an energy investment is, depends on the amount of energy used by the building- if more is used, there is more to save. Consequently, these energy-saving investments are normally costlier than measures that decrease energy usage a little.

The third type of driving force is the ethical incentive that considers the corporate responsibility. Many companies have taken measures that are above regulations to do "what is right". It is also a proactive strategy- that tenants will chose the environmentally aware landlord, serving a marketing benefit.

However, public housing companies have the requirement of acting in a "business-like" way in which profitability is one criteria. The goal with the investments should be that a reasonable return can be made. The profitability depends on which method of interest rate is chosen, which values that are added and how the results are in relation to other investment analysis. The net operating costs is the rent income minus the operational costs. In combination with renovations, the operational costs can decrease a lot due to the energy saving measures made by housing companies. (Blomé, 2010)

### *2.2.3.3 Social effects of renovations*

An important social dimension to consider is the relocation effect due to renovations. In a study by Boverket (2014), 25% of the tenants move out of their apartments in relation to the renovation whereas the control group rate was 14%, which is considered as the normal relocation rate. A strong correlation between the lower income level and the relocation rate was also to be found, meaning that households with a lower income relocated more than the strong income households. A clear trend that could be seen was that renovations led to higher housing allowances for those whom stayed and those who relocate will also get a higher housing allowance compared to what they had before the relocation. Usually indicating that those who shift, move into homes with higher rents. Consequently, the households with lower incomes and without housing allowances are more sensitive to the living costs and will end up relocating. The relocation tends to be towards areas with lower average incomes resulting in increased segregations. Even if there are issues with relocations, there are tenants that want renovations, which increases the pressure on the housing companies to make informed decisions on maintenance.

Westin (2011) points to the issue of companies renovating their buildings for other reasons than the technical. Such motives are to increase the profitability of the company and to increase the

attractiveness of the area for new tenants with higher ability to pay to move in. This is a form of gentrification. In one case, 50% of the tenants were expected to move back after the renovation, whereas in another, 60% moved back (Westin, 2011). Gentrification can happen even when certain groups of people are closed out from the real estate market by for example the high prices/increased prices. Another way is that a household moves out and the standard of the apartment is increased so that a similar tenant to the previous, does not have the possibility to move in there (Marcuse, 1985).

The energy-saving measures that housing companies invest in are paid by the tenants and not the company. Also, more energy saving is made than what is the recommended national goals clearly showing the over-ambition of some housing companies. Since the tenants must pay for this, the housing companies are incentivized to be more energy-efficient than what is considered optimal (Dage, 2013).

One effect that can distress economic sustainability in the long term is that of the renovation project on social costs paid by the public sector. For low income households, the Swedish welfare system delivers economic support related to housing costs and if this level increases (rent level) it will lead to higher social expenditure for the municipality. Both effects are not present in a discussion of strategic building maintenance.

#### 2.2.4 Incentives for renovations/maintenance

Usually there are two incentives for housing companies to invest in maintenance and renovations (Lind, 2014). The first reason is that rents can be increased when measures taken increases the quality of the apartment and the second incentive is that operating costs can be reduced when there is an investment in technical systems. Most often, the two reasons combined, lead to an increase in the net rent. However, this is not the only reason that housing companies are increasingly renovating their stock today.

Rent levels in multi-family houses can be affected in two ways: the first condition reflects the annual property portfolio management costs of housing companies in which the housing company can request for a rental increase. This rental increase is then distributed among the housing stock. The second condition depends on the utility value of the apartments, in which case, the owner can demand a rent increase based on the standard of the apartment being improved. This rent increase should be reasonable to the established rent level and comparable to a similar municipal-owned apartment (Lind, 2015).

Maintenance in Swedish rental law is not a reason for the property owners to increase the rent and therefore replacing the piping system of a building does not give a right to increase the rents. However, if the standard of the apartment is increased, the property owner can increase the rent if the replacement of piping system is combined with a substantial bathroom renovation. This gives the property owners the economic incentive to select a substantial renovation instead of preventive maintenance, sometimes when it is not even necessary (Boverket, 2003).

Rent controls may contribute to increased segregation and gentrification as argued by Lind (2015). Following extensive renovations, the rent can be set at the level of a newly built apartment of the similar standard and location, often close to the counterfactual market rent. Since normal maintenance does not allow housing companies to increase the rents, there are strong incentives to upgrade apartments in attractive locations to increase the standards and

raise the level of rent. Simultaneously, incentives for maintenance are low, affecting the quality of major parts of the built environment (OECD, 2017). To replace maintenance is considered as bad real estate economics: preventive maintenance is replaced with emergency reparations and normal maintenance is replaced with renovation that drive up the rent levels due to the Swedish rental system (Boverket, 2003).

Companies get a tax deduction by performing ROT (repair, conversion, extension) and RUT (cleaning, maintenance, and laundry) works (Swedish Tax Agency, 2017). The ROT is an incentive program for the construction industry that provides a form of tax relief. ROT was expanded to allow discount of 50% on labour cost of these services (Ceccato et al., 2016). ROT work covers the expense for maintenance, repair and renovation. The tax deduction program is applied to those who are private owners to their homes. Moreover, in 2007, RUT deduction tax program came to provide tax credit for the use of household service for instance, cleaning, maintenance, and laundry. The both ROT and RUT tax policy allow a discount up to 50000 SEK per year (Swedish Tax Agency, 2017). This gives an incentive to renovate private single family dwellings but not the multi-family dwellings.

### 3. Method

The aim of the report was to analyse how housing companies are reacting to the aging building stock in Sweden. Part of the aim was also to map out what effects their property management strategies have and if any of the companies follow a “best practice” approach towards renovation. To answer this aim, the following research process has been taken upon:

- a) Finding the research area and formulating the research questions
- b) Investigation method chosen with research design and data collection techniques
- c) Data collection and analysis to lead to valid conclusions

By following this process above, the research conducted can be considered structured and pragmatic (Creswell, 2014). The research method appropriate for this study is a qualitative approach and the research design best-suited is a combination of interviews and case studies, which can be read more in-depth further down.

#### 3.1 Research approach

The research takes upon a descriptive research type. The main goal of descriptive research is to describe the current state of affairs, in which the researcher can only report what has happened or is happening without control over variables.

For this essay, a qualitative research approach is selected since both qualitative data is gathered, providing a more complete understanding of the research problem (Creswell, 2014). The figure bellow illustrates the framework for research and the interconnection of worldviews, design and research methods. By preparing a research proposal in this way, the justification of the research approach can be made (Creswell, 2014).

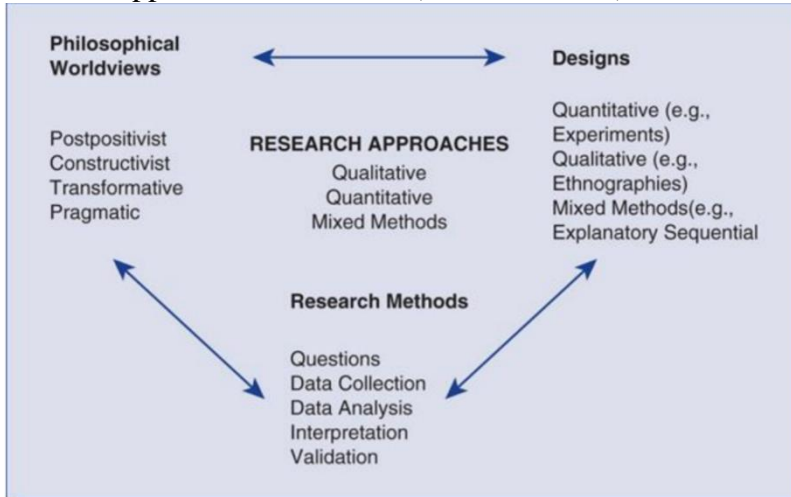


Figure 6. Framework of research and interconnection of worldviews

This research will take upon a pragmatic worldview since it applies to the qualitative methods research, drawing assumptions from both the qualitative research approaches. With a pragmatic view, we are free to choose the methods and procedures that best meet our research purpose. Pragmatism has a focus on the consequence of actions, is problem-centred, pluralistic and real-world practice oriented (Creswell, 2014).

The research design best appropriate for this study, is the qualitative design. The primary data collected in the qualitative design method has been done through direct communication with respondents. Three personal interviews have been conducted in which three case studies have been obtained from respective interviewee.

When data was to be collected, a choice had to be made of whether to collect primary or secondary data (Kothari, 2004).

Three public housing companies have been chosen to give an overview of how they work with their building stock and further one building subject to renovation from each company is analysed to show what measures were taken and what were the consequences (rental increases, social effects, etc.)

### 3.2 Literature review

The literature review in qualitative research should be consistent with the assumptions of learning from the participant and not only suggesting questions that need to be answered from the perspective of the researcher. The main purpose of conducting a qualitative study is that the study should be exploratory, usually implying that not much has written about the topic previously (Creswell, 2014). Creswell (2014) illustrates three different placements of the literature review (figure 14).

Use of the Literature	Criteria	Examples of Suitable Strategy Types
The literature is used to frame the problem in the introduction to the study.	There must be some literature available.	Typically, literature is used in all qualitative studies, regardless of type.
The literature is presented in a separate section as a review of the literature.	This approach is often acceptable to an audience most familiar with the traditional postpositivist approach to literature reviews.	This approach is used with those studies employing a strong theory and literature background at the beginning of a study, such as ethnographies and critical theory studies.
The literature is presented in the study at the end; it becomes a basis for comparing and contrasting findings of the qualitative study.	This approach is most suitable for the inductive process of qualitative research; the literature does not guide and direct the study but becomes an aid once patterns or categories have been identified.	This approach is used in all types of qualitative designs, but it is most popular with grounded theory, where one contrasts and compares a theory with other theories found in the literature.

Figure 7. The use of literature in research

When the literature review is placed in the introduction, similarly to this essay, the aim is to provide a useful background for the problem that has led to the need for the study. When the literature review was being conducted, a systematic approach was not used in the beginning, however, to find relevant materials, identification of key words was done so that articles related to the research question could be found. Around 40 articles related to the research topic were found and through snowballing, another 15 articles were found. A literature map was designed to give a grouping of literature on the topic that further allowed to position the study within the larger body of research (Creswell, 2014).

### 3.3 Data collection

- **Electronic databases**
  - Database in *Stadsbyggnadskontoret* has been used to extract the drawings that are used in the result section about the projects. Information about the exact changes can also be found in this public database if the registration number of the property is known. In the public database, the property registrations number was entered for each of the three projects and the information which was relevant for the project was extracted. The information found useful in the databases was details about recent renovations and what new plans were made.

- Boverket is the Swedish National Board of Housing, Building and Planning, which is a central government authority that review developments within the fields of housing, building and planning. Their task is to gather facts and statistics in Sweden to describe and understand the development to make policy suggestions. Since this is a governmental authority, the trustworthiness of the data gathered is high and valid to use in this essay.
- **Public surveys**
  - SABO is the Swedish Association of Public Housing Companies, which is the organisation of the municipality owned public housing companies in Sweden. The public housing sector represents almost 20 percent of the total housing stock in Sweden and together own about 800 000 dwellings. Studies conducted by them are therefore considered widely applicable in the aim of this research.
- **Journal articles** that were refereed were used since they are easiest to locate and are higher in quality compared to dissertations. However, dissertations were used only when searching for other researchers in the snowballing process.
- **Conferences** that have been attended to provide the ambition of the politicians and illustrate how other companies work with renovations include the annual renovation day in Stockholm on the 28<sup>th</sup> March. After attending this conference, it was possible to see what view the government had on the renovations and it helped to limit the research study further.

### 3.4 Interviews

Interviews with Familjebostäder, Poseidon and Bostadsbolaget about their approach to property management and how they perceive the effects of their chosen strategies. Face-to-face interviews have been conducted and unstructured, open-ended questions have been used to be able to elicit views and opinions of the respondent. The advantages behind this type of method is when participants can provide historical information and allows the researcher to control the line of questioning. Disadvantages of this method is that the information provided is filtered through the views of the interviewees and the responses may be biased due to the presence of the researcher. Another identified issue is that not all the respondents will provide equally articulate responses and therefore one interview may be more elaborate than the other (Creswell, 2014).

Since the idea behind qualitative research is to *purposefully select* participants (Creswell, 2014) and before decision of who to interview could be made, four aspects were considered (Creswell, 2014):

- The setting (where interview will take place)
- The actors (interviewees)
- The events (what the actors that will be interviewed will be doing)
- The process (the evolving nature of events undertaken by the actors within the setting)

From these four aspects, the decision was made to interview the renovation project managers of each of the company in their natural environment. The renovation project managers were interviewed in all three of the companies assuring that the similar type of role provided the

results from which conclusions could be deduced. The interview time decided was during the working hours of the respondents so to allow them to relate to their natural work environment. In the interview, there is no process that took place more than the respondent sitting across from the interviewer, discussing the questions. Each of the interview lasted for about an hour or more in which the questions were placed and the respondent was given the opportunity to respond openly due to the structure of the interviews (see appendix 2).

### 3.5 Case study

For each of the company interview, an example project of respective organisation has been analysed to exemplify the strategies that the companies use. The data for each of the project that is either on-going or completed, has been collected from:

- Economic information attracted from the public housing company's annual reports. The advantages of these documents are that they represent data which the participants have given more attention to and is written evidence saving time and expense of transcribing (Creswell, 2014). This allows to see the trends in the company and what they choose to focus on in their work.
- Drawings from Stadsbyggnadskontoret and here information about maintenance and renovation can be found in detail
- The interviews with each renovation project manager

### 3.6 Results and Analysis

Qualitative studies result in a large amount of data, resulting in an extensive and time-consuming analysis. The material from the interviews were actively journaled and not recorded because of ethical concerns. Therefore, the long process of transcribing could be skipped and the important parts of the interviews included straight away. The three interviews are presented separately with the same structure and then in the synthesis they are combined and compared. After the first interview was completed, it was analysed and the structure of the final report was organised before more interviews were continued. This allowed a clear structure to be seen of the results and so the next interviews just had to be added in the "skeleton".

### 3.7 Validity of the results

According to Creswell (2014) and Kothari (2004), the steps taken to check for accuracy and credibility need to be conveyed to the readers. Qualitative validity checks for the accuracy of the findings by employing certain procedures. Validity is regarded as the strength of qualitative research since it is based on determining whether findings are accurate from the researcher's standpoint, participants and readers of an account. Other terms that are similar to validity are trustworthiness, authenticity and credibility.

One strategy that can be used to convince the accuracy of the results is by clarifying the bias that the researcher brings to the study. The result interpretation can be affected by the researcher's background, for example gender, culture, history and socioeconomic origin (Creswell, 2014). In this study, one such bias could be that prior to interviewing the public housing companies, interviews with a consultant with many years of experience in the private housing market was carried out. Since the private housing companies may have different views on renovation and what incentives they have, these views were almost expected from the public



housing companies. However, the questions that were asked to the interviewees were not influenced by previous knowledge gained about the ways the private market maintained their stock, since the questions were formulated prior to this. Therefore, the risk of bias can be in the analysis which has been read a few times by the researchers to assure that any subjective views are not included in the analysis.

Peer-reviewing is a well-established strategy to enhance the accuracy of the results and adds validity. Two peer-review sessions have been conducted; one early on in March and the second one in a more formal setting with the examiners present in May. These two sessions have been conducted with two different researcher groups to assure that the results are valid.

Checking the notes taken from the interviews and matching them with the final text in result and analysis has been done to make sure that no mistakes have been made when the notes were interpreted.

The three strategies above for validity have taken place to assure the accuracy of the findings and allows them to be widely applicable.

### 3.8 Ethical concern

Since research involves collecting data from people, about people, it is necessary to include anticipated ethical issues. Researchers need to protect the research participants, develop a trust with them, promote the integrity of research, guard against misconduct and immodesty that may reflect their organizations. Four main ethical considerations related to this essay are listed below (Creswell, 2014):

- whether there is harm to participants
- lack of informed consent
- invasion of privacy
- whether deception is involved

Prior to collecting data, when the study was initiated, an ethical issue that was accounted for was to what extent disclosure of the study should be made and a way to solve this is to contact the participants and inform them of the general purpose of the study and how the data will be used (Creswell, 2014). Another ethical consideration is to make certain that all participants receive the same treatment (Creswell, 2014) and this is done by staying with the questions stated in an interview protocol.

Regarding the data analysis, the privacy and anonymity of participants is important and therefore names of participants are not listed in this essay, only the representation in form of the company name is used. In that way, the privacy of an individual is not infringed upon.

## 4. Results and Analysis

The following chapter begins by introducing the description of the three different public housing companies selected in this study. For each company, a case project has been analysed to illustrate how the housing companies work in practice and how they work with social effects of renovations.

### 4.2 Description of case studies

The following chapter includes results of the interviews that have been conducted with the managerial level in three different public housing companies owned by *Framtiden AB*. Framtiden AB is a real estate company owned by Gothenburg which includes houses, property management and production of new houses. This is the mother company of the main public housing companies in Gothenburg and owns approximately 72 000 apartments in Gothenburg (Framtiden, 2017). Framtiden AB owns Familjebostäder, Poseidon and Bostadsbolaget.

The aim with the interviews was to find out how the public housing companies worked with their properties and how the processes looked like. Firstly, the profile of *Framtiden AB* is given and then each company is presented with their perspective on sustainability affected by the renovations in theory or by vision. Additionally, one case study is presented by each of these companies to illustrate the outcomes of the effects in practice. When the case projects are analysed, a best-practice among the housing companies can be realised depending on how they manage the social effects of their maintenance plans and renovations.

#### 4.2.1 Profile: Framtiden AB

(Familjebostäder, Poseidon & Bostadsbolaget belong to this profile)

#### ***Public housing company with a good economy in strong real estate markets***

Houses located mainly in and around Gothenburg. There are no vacancies in these apartments, high solidarity and a relatively high market value on their properties. The mother company has approximately 90 000 apartments built between 1961-1975 in need of refurbishment (SABO, 2009). They have relatively good possibilities to finance refurbishments, however, they own large residential areas where substantial investments are required to restore social problems and segregation. There is a potential to increase rental income but these possibilities depend on the housing area and attractiveness.

#### 4.2.2 Familjebostäder

*Table 1. Fact sheet Familjebostäder*

Fact sheet	Familjebostäder
Number of apartments	18500
Million Homes	33%
Locations	Majorna, Bergsjön, Angered, Hisingen etc.
Strategy/Renovation process	Emergent needs, mini/midi/maxi
Responsible	-

Familjebostäder work with priority when it comes to restoration of buildings. The company does not use any general renovation process, but base their work on emergent needs. The homes in greatest need of renovation will be taken care of first and which building is in greatest need depends on indicators that are collected by the facilities management department. After the indicators are assessed, the latest actions that have been invested in the building are analysed and finally the technical service life and condition is looked at. This means that the renovation plans take place within the maintenance planning and based on the technical assessments made by the facilities manager in each of the different areas. The property portfolio includes both suburban and urban regions within Gothenburg and some of their buildings need a total renovation where all plumbing systems need to be replaced, the facades changed and the bathrooms renovated. In some apartments, the maintenance had been delayed to such a great extent that more substantial actions needed to take place, such as replacing whole kitchens and changing balconies.

The company follows the SiRen framework for sustainability considerations and are satisfied at a mediocre level when assessing social, economic, environmental and form. There is a cooperation between the different areas within Gothenburg and certain areas are known as development zones, where there is a greater focus on social sustainability. One way that Familjebostäder have tried to fulfil social sustainability is through an agreement with the tenant's union in which they need to engage is stakeholder communication and involvement prior to renovations to get 100% affirmativeness from the tenants living in the homes.

#### *4.2.2.1 Sustainability per Familjebostäder*

**Economical:** The goal for the properties is to keep them well-maintained to create pleasant environments. This will help achieve the goal of reaching a stable economic development. Strategies to fulfil these goals include a well-functioning dialogue and a broader view with regards to the local preconditions. Another strategy that the company uses is to accomplish effectiveness in the organisation and continues to develop the rent levels.

**Environmental:** The goal is to decrease the environmental effect of their organisational activities. Further strategies to do so is to reduce the energy usage, support the tenants to reduce their own environmental loads and to cut the amounts of wastage by instead enhancing re-use and recycling.

**Social:** Three areas are considered in the social sustainability work of the company- integration, co-workers and tenants. Integration should be enhanced while also creating jobs and better living conditions to strive towards a socially more sustainable city. Further strategies to do so is to develop Bergsjön, which is a notorious suburb of Gothenburg, create job opportunities within the housing areas and work for social inclusion. Familjebostäder wants to be one of the five most attractive employers of Gothenburg through good leadership, health of the employees and to work with ethics in the daily organisational activities. Regarding tenants, Familjebostäder continue to engage in customer satisfaction, develop tenant influence and create good relations with the tenants at an early stage. In the specific project of *Tellusgatan*, a customer service was employed to ensure proper communication with the tenants since the renovation is an extensive one where most of the functions need to be replaced and fixed.

### 4.2.3 Project: Tellusgatan

Table 2. Fact sheet Tellusgatan

<b>Tellusgatan</b>		
Annual Energy usage before renovation	kWh/m <sup>2</sup>	169
Decreased annual energy reduction/allowed	kWh/m <sup>2</sup>	109/110
Energy usage reduction	%	36
Cost of renovation	SEK/m <sup>2</sup>	15848
Rent increase, average	SEK/m <sup>2</sup>	298
Renovation year	Year	2018
Value Year	Year	2005
Number of apartments	No.	169
Ventilation installed	Type	FTX
Population	People	47478
Income (East Gothenburg)	SEK	192300
Rental housing: Private	No.	6431
Rental housing: Public	No.	9785

This building was constructed in 1968, located in Bergsjön with a walking distance to both local grocery shopping and green areas with lakes. Even with its local charm, Bergsjön is in the outskirts of Gothenburg, notorious for gang crimes. The apartments in Tellusgatan were in a very bad state due to delayed maintenance, the quality of the building had not been sustained for many years. Renovations of Tellusgatan was permitted in 2015-12 and the construction works started in 2016 and is still on-going. In relation with the renovation, the tenants had to move out to temporary apartments due to the extent of the work. This is a total renovation (rotrenovering) and Familjebostäder decided that this was necessary due to the bad state in which the apartments were in. So, in combination with replacement of piping systems, the apartments were totally cleared out and are renovated with the additional choices made by the tenants. If no additional choices were made, the bathroom was renovated only and the walls/floor worked upon. A lot of exterior work has been done by adding greens in the surrounding area to create an attractive neighbourhood as can be seen in the figure below.

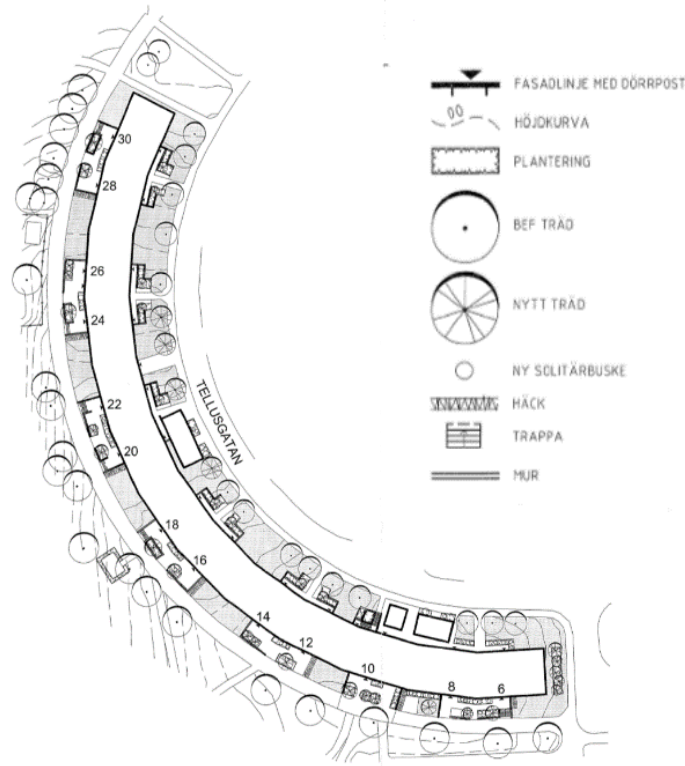


Figure 8. Tellusgatan, situation plan, SBK (2017)

Solar panels had been planned in the drawings but Familjebostäder do not confirm this, due to complications such as economic feasibility, but there was an initial plan to use solar energy implying a higher ambition by the renovation project manager even if this did not happen in practice.

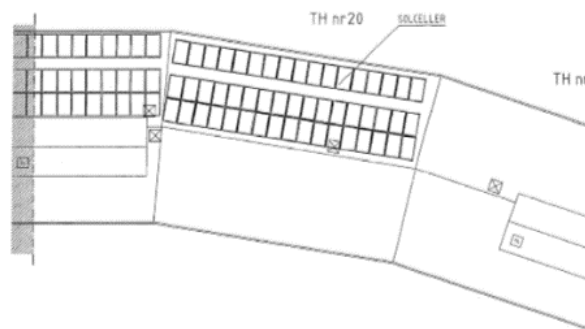


Figure 9. Plans showing that solar panels were to be built, SBK (2017)

New piping system and FTX-ventilation system has been installed to replace the old system. In the apartments, the current wall between washing room and bathroom is demolished to create accessible bathrooms. In the bathrooms, the windows are put back. The balconies are made bigger by moving them out more. The walk-in closet on the side of the balcony is removed and replaced by wardrobes. The apartments also got new inner walls and floors.

The facades are additionally insulated and façade panels are used. All the windows are replaced as well with lower u-values. Additional insulation is used on the outer wall of 120 mm. Theoretically, the energy saving measures will save around 60 kWh/m<sup>2</sup> and year (cannot be measured since the renovation is not complete yet) from the current 169 kWh/m<sup>2</sup> and year. The individual heating water measure has been placed in each apartment so that the more the tenant will use, the more he/she will pay. This means that the building has the potential to reach down to a consumption of 109 kWh/m<sup>2</sup> and year (Formas, 2012) with the requirement being below or equal to 110 kWh/m<sup>2</sup> and year.

As can be viewed from the rent development graph, at year 10, the average rent increase will be 45.1% (from 912 to 1323 SEK/m<sup>2</sup>) higher than if the deep renovation would have not taken place. For existing tenants, a rental stair increase will take place over ten years and for the new tenants, the higher rent will be paid at once.

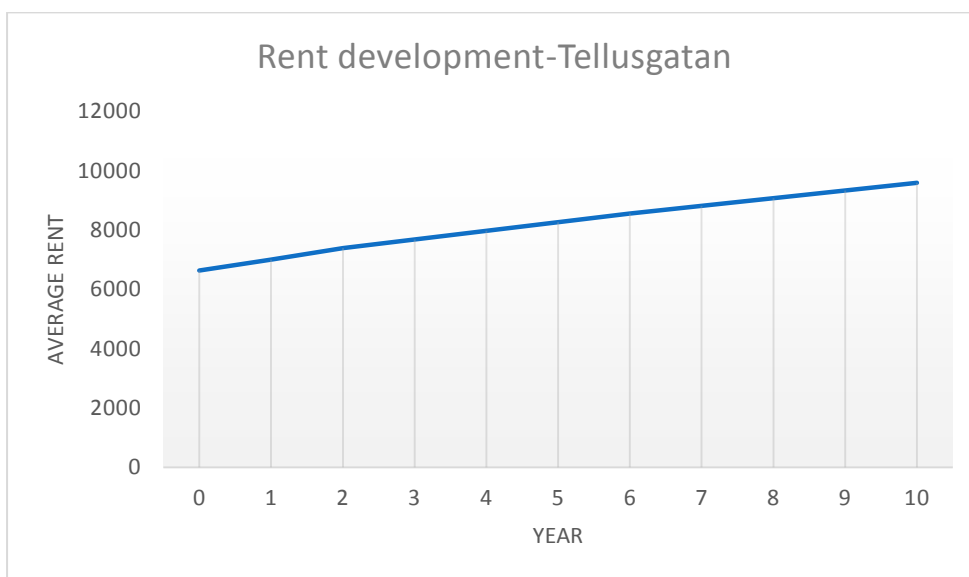


Figure 10. Rent development Tellusgatan, own figure

Cooperation group appointed to inform the tenants early in the project phase about the renovation and the different alternatives that the tenants have. The tenants were involved early in the project and one apartment was renovated and used as a viewing apartment that the tenants could come and explore to see what options that they had in their own home. For this renovation, the tenants could choose between the basic level or the additional levels such as a new kitchen (resembling the differences made by Lind et al. (2014)). Another important social aspect for Familjebostäder in this project was to employ locals and tenants to work with the outdoor environment and the tenants could have a lot of influence at this stage.

## Summary

Familjebostäder have been ambitious when it comes to the energy efficiency of the building performance. Even if the new energy consumption is theoretical and will differ depending on the lifestyle of the tenants, the real value will not be too far away from the theoretical.

Effects of rent increase on the relocation rate is yet unknown since the project is not completed. However, since the new rent (after ten years for current tenants) is 45.1% higher, it is possible

to presume that some tenants will not move back to their apartments even if they could influence the outcomes of their homes (Allen, 2000). Boverket (2014) found in their study that there was a strong correlation between the lower income level and the relocation rate, which can be expected in Tellusgatan as well since Bergsjön is on the lower end of the income level being 28.6% less than the average income level in Gothenburg.

The economic aspects such as an acceptable rate of return must have been accomplished since the company would not go ahead with the project otherwise. Therefore, the case project is considered profitable for the company with the help of increase in rental income and decrease in operational costs.

The project can also be questioned of supporting gentrification of the area due to the rental increase and the increase of standard after the tenant moves out to attract stronger income households (Marcuse, 1985, Westin, 2011). At the same time, Familjebostäder try to employ their tenants to work with the surrounding environments as part of their social sustainability. This does not however mean that they are excused from the rental increase. The current tenants do get to pay the increased rent over a period of ten years after which the full rent will be paid by the tenant. It could be implied that even if the current tenant does not relocate at once, they may a bit further ahead after seeing the effects of the rental increase on their household, especially if the tenant is that of the passive group (Westin, 2011).

If the renovation project is connected to the S2020 indicators, all the indicators have been satisfied, since the project managers had a dialogue with the tenants throughout the project, especially in the planning stages to gain acceptance.

#### 4.2.4 Poseidon

Table 3. Fact sheet Poseidon

Fact sheet	Poseidon
Number of apartments	26900
Million Homes	30%
Locations	Angered, Frölunda, City centre etc.
Strategy/Renovation process	Assessments continuously, mini/midi/maxi
Responsible	-

Poseidon is currently focusing on four large areas- Lövgärdet, Backa Röd, Hjällbo and Glasmästaregatan. The three prior areas are in the suburbs of Gothenburg and the last in central Gothenburg. These buildings have different needs and that is how Poseidon must plan their work. Since the buildings are in certain areas, the circumstances vary of what can be done and to which extent, regarding the standard increase of the buildings. Before deciding what actions to go ahead with, they have created joint consultation groups in collaboration with the tenants' union in which different levels of renovations are decided. However, some things are in serious need of amendment and sometimes this can be against what the tenants and the union want to accept.

Poseidon work in two different ways with renovation- either with three packages or the mini-level + add-on options. The package options include a mini, midi and maxi level. The lowest level of renovation is the mini-level and this is a must- which is as low as possible to give the least rent increase as possible. The next level is the midi-level in which sometimes the kitchen standard is improved. The maxi-level includes almost a total renovation, the floor is replaced, the kitchen is replaced along with all accessories and the apartment is substantially increased in standard. The maxi-level is much more expensive than what it needs to be since it compensates for the mini-level which is not that costly and does not generate a lot. When a tenant moves out, a maxi-renovation of that apartment is carried out- with a rent increase awaiting. Over ten years, 50% of the apartments should be of maxi-level.

The rent level is controlled by the rental control laws, but Poseidon do not think that there is a balance between the rent level and the costs of the apartment. According to law, maintenance is the responsibility of the housing company in terms of both expenses and carrying out. However, the development of these expenses is increasing much faster than the level of rent that the housing company can require from the tenant. Since the government does not provide with funding anymore for larger measures that the housing company needs to invest in, they are left with two ways of financing the increasing renovations in the future- a) the annual negotiation of rent increase which is a percental increase that all tenants pay and b) small rental increases from the renovations. Method a is a way of acquiring money from the whole stock and it is then used in certain areas which need that funding. This means that money that some tenants pay is not used within that area, it is used for other tenants and locations within the portfolio. The negotiated rent increases do not have the aim of maximising profits; it is rather a



harmonised process in which Poseidon seek a balance between covering the expenses and providing affordable homes to tenants.

The goal with maintenance is to keep long-term plans and not only do what is “cosmetic”. For this reason, Poseidon plan maintenance and within these are the plans for renovations. The renovations are however focused to the areas that are in most need of it first, in this case Lövgärdet, Backa Röd, Hjällbo and Glasmästaregatan. When renovations are planned, technical improvements such as insulation, ventilation and the ventilation steering are combined. This will enable Poseidon to improve the quality of the building while at the same time increasing the efficiency of the energy usage. They have conducted a passive house standard renovation on one of their buildings in Backa Röd in which they had used solar cells as energy source. However, this is not seen as economical feasible according to the company since it is a very complicated process and very administrative. Instead, it is better to assess such investments in new production, when no changes must be made such as in renovations.

### *Sustainability per Poseidon*

**Economical:** A good economy creates a sense of security and sets the preconditions of acting like a long-term property owner. The long-term vision is to develop the real estate value, make the organisation more efficient and have a good solidity. The results that the company wishes to establish is a property value result of 640 SEK/m<sup>2</sup> before maintenance.

**Environmental:** Poseidon want to be the leaders in directing the development towards environmental sustainability. By making the right choices internally and giving our tenants the incentives to be more environmental conscious, Poseidon believe that they can help the city become greener. Their ambition is to minimise the total building stock energy usage by 1% and add ten new environmental buildings/rooms to their stock. Another implementation is the tenant having to pay for their own consumption of hot water, which has shown to decrease energy usage.

**Social:** All the tenants should live with good relations and safe living areas. They should also be given the right to influence their living standards and Poseidon want to create the prerequisites needed to promote social gatherings, accessibility and a meaningful leisure time. This is to be accomplished by having a service index (service provided to the tenant rated by them out of 100) of at least 80 and an influence index (level of influence the tenant has) of a minimum 75. Another aspect that Poseidon consider is to allow the tenants to choose their personal home by add-on options. They also want to offer 249 homes for their social housing commitments. They also work with social regards in contracts which they require from their suppliers as well. Another form of social regards in contracts is employing people with foreign backgrounds which Poseidon encourages.

For their employees, they strive to offer good employment conditions and a strong diversity. This is to be ensured by having a healthy attendance of at least 65% and a motivated employee index of at least 70.

### 4.3.5 Project: Näverlursgatan

Table 4. Fact sheet Näverlursgatan

<b>Näverlursgatan</b>		
Annual Energy usage before renovation	kWh/m <sup>2</sup>	136
Decreased annual energy reduction/allowed	kWh/m <sup>2</sup>	76/110
Energy usage reduction	%	44
Cost of renovation	SEK/m <sup>2</sup>	9068
Rent increase, average	SEK/m <sup>2</sup>	258
Renovation year	Year	2016
Value Year	Year	2011
Number of apartments	No.	122
Ventilation installed	Type	FTX
Population	People	57372
Income (Frölunda)	SEK	293800
Rental housing: Private	No.	5875
Rental housing: Public	No.	8177

Näverlursgatan is in Västra Frölunda, right next to the big shopping centre *Frölunda Torg*. Even if this location has been given an up-lift by the municipality, many of the current tenants living in these locations are considered of lower income households. There are four identical buildings placed adjacently and Poseidon has planned to renovate all four of them, one at the time. The first building was completed in 2016 and since a lot of work had to be done, the tenants had to move out during the construction period. The existing tenants get the right to the internal que to get a temporary apartment and Poseidon have a 10% relocation/change of tenant and have 4500 apartments in this district. This implies that they can provide 450 apartments within this district. Poseidon were permitted to begin construction in 2015-08 and completed the project around a year after this time.

The building needed new ventilation systems, heating systems, piping systems, electrical systems, water proofing, bathrooms, kitchens (due to bathrooms causing damage in the kitchen), lifts, roof and changes to be able to comply with fire safety regulations. The tenants could then besides the basic level, choose additional features in their apartment which would cost more than the basic level. When an existing tenant moves out of the apartment, the apartment is renovated to the highest standard so that the maximum rent level can be demanded. Poseidon have the goal of renovating 50% of the apartments in this building to the maximum renovation level.

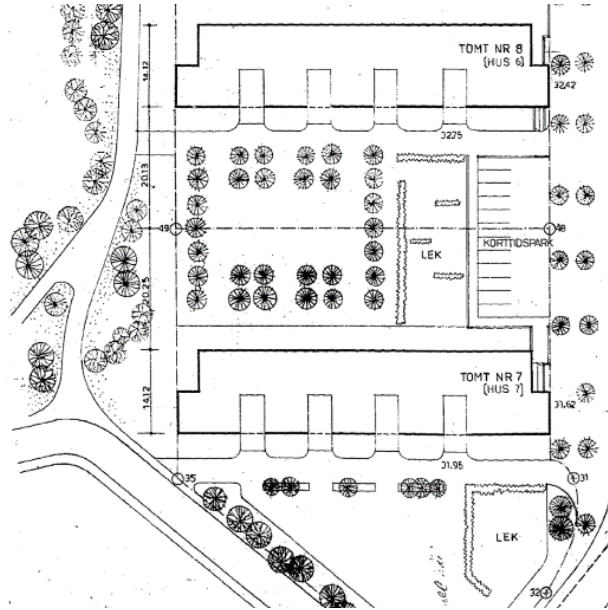


Figure 11. Näverlursgatan plan, SBK (2017)

From an environmental perspective, the building has been additionally insulated with 120 mm mineral wool, an FTX-system has been installed and windows have been replaced. These actions have a positive effect on the energy usage and an approximate decrease of 60 kWh/m<sup>2</sup> and year can be made resulting in 76 kWh/m<sup>2</sup> and year from 136 kWh/m<sup>2</sup> and year, which is far less than the maximum of 110 kWh/m<sup>2</sup> and year.



Figure 12. Näverlursgatan, façade, SBK (2017)

Similar to Tellusgatan, Poseidon offered the tenants of Näverlursgatan a rent increase over ten years showing an increase of approximately 43% (from 925 to 1325 SEK/m<sup>2</sup>). Existing tenants will pay a higher rent over time but the new tenants will pay the higher rent once the renovation is done and they move in to this apartment.

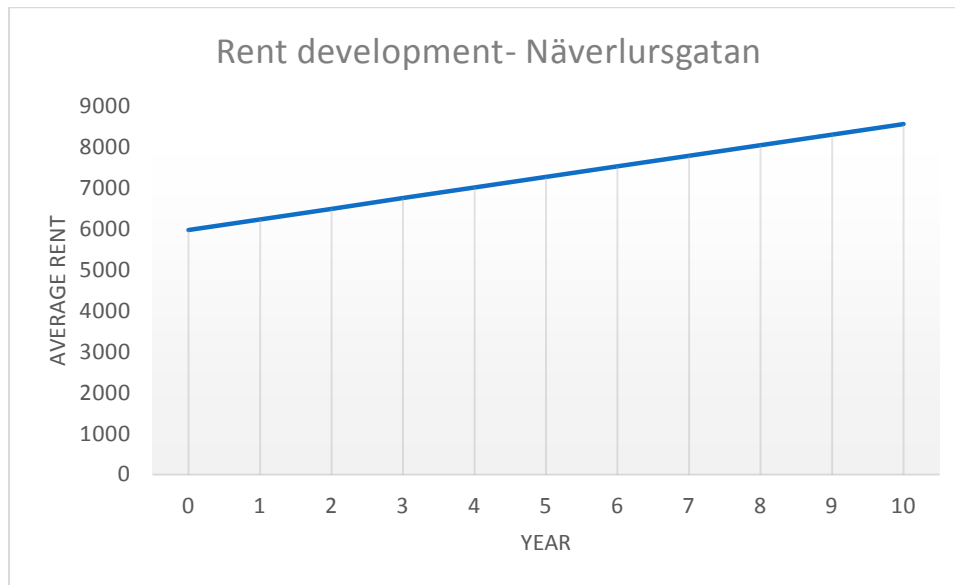


Figure 13. Rent development Näverlursgatan, own figure

The tenants were given the choice of different add-on options but the minimum level that Poseidon had to go ahead with included a bathroom renovation and a kitchen renovation since there were damages from the bathroom that affected the kitchen. Consequently, a higher rent level can be demanded in the negotiation with the tenants’ union even for the basic level of renovation since it includes more amendments than the “ordinary” basic renovation. Thus, more tenants may have to leave their homes and seek for cheaper housing.

### Summary

Poseidon have carried out three energy-saving measures including additional insulation to facades, installation of an FTX-system and replacement of windows resulting in an energy usage decrease of 60 kWh/m<sup>2</sup> and year from the current 136 kWh/m<sup>2</sup> and year, whereas the standard for this building allows a maximum 110 kWh/m<sup>2</sup> and year.

Relocation rates are difficult to assess yet, however, an approximate figure is 20% (Poseidon, 2017) which is 6% higher than the normal relocation rate of 14% (Boverket, 2014). The rent levels over ten years will result in an increase of 43% compared to the current rent level which is paid by the new tenants straight away. Since the kitchen was necessary to renovate as well due to damages from the sanitary room, the rental increase may have been inevitable, however the energy-retrofitting investments could be questioned instead, which the tenants must pay for.

The average income for this region in Gothenburg is higher than the average level in Gothenburg by 9.1% and therefore an argument for if gentrification has occurred cannot be made, even if the housing companies intentions may have been so by increasing the standards of the apartments once the existing tenant leaves their home.

Poseidon have worked with the identity and experience indicator of the S2020 social indicators by considering the indoor environment and the standard and the quality of the building materials

compared to other buildings. Poseidon have not worked as much with strengthening the area around the building and have mostly focused on the building itself and made investments there.

#### 4.3.6 Bostadsbolaget

Table 5. Fact sheet Bostadsbolaget

Fact sheet	Bostadsbolaget
Number of apartments	23 300
Million Homes	35%
Locations	Hisingen, City centre, Angered, Hjällbo etc.
Strategy/Renovation process	Collaborative updates, mini/midi/maxi
Responsible	-

Bostadsbolaget work with planned maintenance and restore buildings that have emergent needs. This is done by working with areas instead of individual building, strengthening the social factors by not isolating an individual building and only increasing the standard of that. No specific renovation process is used; such decisions are made based on their two-year maintenance plan. The maintenance plan is only set for two years since they believe that it is not possible to plan further ahead due to changing circumstances. In this maintenance plan for *each area* and not building, a simple matrix is used to communicate the status of the dwellings internally in which the facilities manager fills in what needs the area has and how emergent these needs are by rating them from 1-3, 1 being the most emergent, where actions are required within the first two years, 2 being medium emergent and should be amended within 2-5 years and finally 3, where actions are required within 5-10 years. The property managers then assess each of the different needs and try to map out where there are greatest needs and if some of the actions can be clustered and performed together to minimise disturbances to the tenants by not scaffolding several times in a year over longer periods. This means that some actions can be taken care of earlier than needed but also much later than scheduled. Bostadsbolaget carry out internal inspections of the dwelling areas depending on the matrices and in this way, can evaluate further needs in close collaboration with the facilities manager and the tenants.

Collaboration with the tenants and the facilities manager is done through what Bostadsbolaget name *Knowledge base*. The tenants and the facilities managers actively provide knowledge in this base about the houses and the areas and the property managers review this information and further judge what inputs can be made to keep happy tenants and attract future tenants.

#### **Sustainability per Bostadsbolaget**

While assessing the different effects of renovations, Bostadsbolaget work in close collaboration with the different departments including the facilities manager of the individual areas who knows the area the best and what needs there are.

**Economical:** The economic conditions in Bostadsbolaget should be in balance and an important question is what effects the economy has on the local market. The aim is to make investments

that give a balanced return and another main question is how the economic circumstances affect the local area.

**Environmental:** Additional insulation to the facades, window replacement and ventilation with heat recovery are common measures used by Bostadsbolaget in their environmental work with the aim of energy savings. Bostadsbolaget are trying to increase their environmental awareness by buying materials that are certified and produced ethically. Proper waste management is promoted. Energy usage is

**Social:** Bostadsbolaget provide good working conditions, safe working environments and education for their employees. For the tenants, cooperation is a big focus, since a lot of the information about the dwellings and the living conditions is obtained from the tenants itself. That is also why they emphasize the importance of tenant involvement with the facilities manager to provide realistic feedback. Another important factor is to ensure that there are good employee conditions along the supplier chain so this is checked by the purchaser.

#### 4.3.7 Project: Eketräkatan

Table 6. Fact sheet Eketräkatan

<b>Eketräkatan</b>		
Annual Energy usage before renovation	kWh/m <sup>2</sup>	132
Decreased annual energy reduction/allowed	kWh/m <sup>2</sup>	72/109
Energy usage reduction	%	45
Cost of renovation	SEK/m <sup>2</sup>	8340
Rent increase, average	SEK/m <sup>2</sup>	228
Renovation year	Year	2016
Value Year	Year	1980
Number of apartments	No.	87
Ventilation installed	Type	FTX
Population	People	47754
Income (Lundby)	SEK	268600
Rental housing: Private	No.	8849
Rental housing: Public	No.	5460

Bostadsbolaget have 35% folk homes (commonly built 1930's-1967) in their building stock. The folk homes in Kyrkbyn were built during the 50's and are typically narrow in width and short in length. These are three-floored apartments that were easier to build by the contractors because of their size. This area was built with many of these homes to create more open spaces for the tenants. Bostadsbolaget did not have to make any substantial changes to the building since regular maintenance had been planned and managed well. However, it is in the middle of Biskopsgården (Gothenburg suburb) and Bräcke (located in Eriksberg, where typically high-income households live).



Figure 14. Ekeströmgatan, facades, SBK (2017)

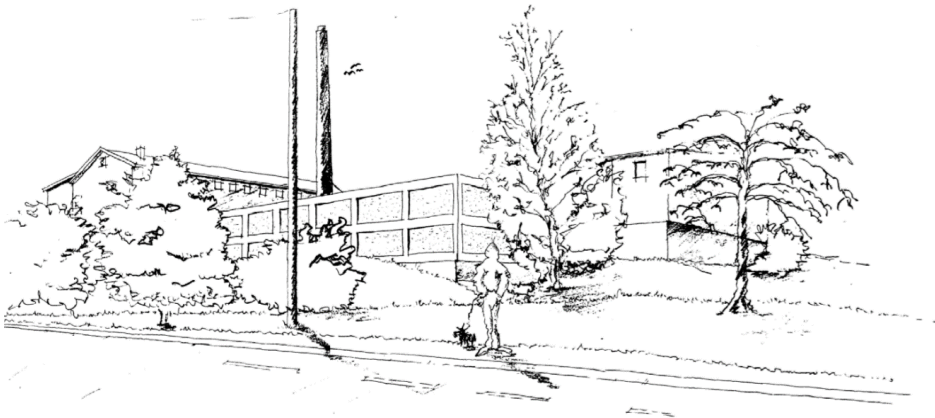


Figure 15. Ekeströmgatan, outdoor environment, SBK (2017)

The facades have been additionally insulated with 50 mm of mineral wool and 20 mm of finishing mortar, but have given the same look as previously to keep the 50's-charm. The windows have been replaced but have also been given a retro-look with the divided windows. Also, FTX-systems have been installed to replace the old ventilation system without heat recovery. These are also the energy saving measures that Bostadsbolaget work with, considered economically efficient. The current energy usage is 132 kWh/m<sup>2</sup> and year and with these measures, the new energy level can become 72 kWh/m<sup>2</sup> and year with the requirement being 109 kWh/m<sup>2</sup> and year or less.

The project did not involve any additional options for renovation, all the apartments were renovated to the same level of standard. This is also how the new rent level is decided, based on the utility value system. This in turn depends on the standard, quality and services of the apartment.

Since Bostadsbolaget did not use a rental stair for the rent increase, the existing tenants and the new tenants will pay the new rent after the renovations. In this case, the rent increase is 23.7%.

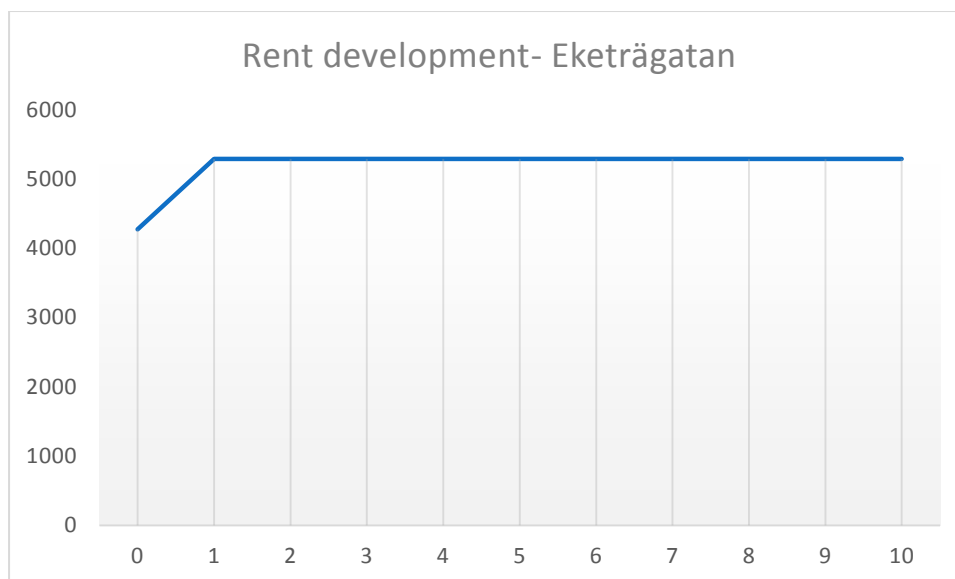


Figure 16. Rent development Eketräkatan, own figure

Tenant involvement was initiated early in the process but since Bostadsbolaget did not have to make substantial changes more than the bathrooms in relation to the plumbing system, there were no discussions initiated.

### Summary

Bostadsbolaget have implemented two energy-saving techniques in their project in Eketräkatan. Firstly, the building façade is additionally insulated and secondly a new FTX system replaces the old ventilation, creating a new potential energy consumption of 72 kWh/m<sup>2</sup> and year from the previous 132 kWh/m<sup>2</sup> and year. Other than the new piping system and bathroom, these are the two measures that took place, besides the additional options that the tenants had. The rental increase is 23.7% and paid at once, with no rental stair increase in place, both by current and new tenants.

Since Bostadsbolaget did not include many measures in the renovation, only what they needed along with some energy-saving measures, a smaller rent increase can be seen based on the utility value principle. Smaller relocation levels can be expected in this area since the rent level increase is not higher than the average increases (Mangold, 2016) and the average income for this area is just about 0.3% lower than the average income in Gothenburg. Therefore, arguments for gentrification are not strong even though an average level of rent increase has taken place.

The S2020 indicators cannot be strongly reflected in the renovation project since a lot of focus has not been made on the environment, however, Bostadsbolaget have worked a lot with the well-functioning every day indicator. The tenant received all information and instructions in relation to the renovation and the renovation results in a reasonable rent increase.

The buildings did not receive extensive renovations more than necessary and one reason could be that regular maintenance had been planned and managed well as stated by the facilities manager.



## 5. Discussion

		<b>Tellusgatan</b>	<b>Näverlursgatan</b>	<b>Eketrägatan</b>
Annual Energy usage before renovation	kWh/m <sup>2</sup>	169	136	132
Decreased annual energy reduction/allowed	kWh/m <sup>2</sup>	109/110	76/110	72/109
Energy usage reduction	%	36	44	45
Cost of renovation	SEK/m <sup>2</sup>	15848	9068	8340
Rent increase	SEK/m <sup>2</sup>	298	258	228
Renovation year	Year	2018	2016	2016
Value Year	Year	2005	2011	1980
Number of apartments	No.	169	122	87
Ventilation installed	Type	FTX	FTX	FTX
Population (in each area)	People	47478	57372	47754
Income (average in each area)	SEK	192300	293800	268600
Rental: Private housing	No.	6431	5875	8849
Rental: Public housing	No.	9785	8177	5460

*Figure 17. Summary of the three projects*

Familjebostäder work with the buildings that have emergent needs when it comes to renovations. Indicators are collected by the facilities manager to depict the needs of different buildings and a combination of the year of construction decides whether it is time to renovate or not. The company has facilities managers for different areas that provide feedback to the renovation manager who then allocated the different funds based on the needs and what location is prioritised in their annual report. The state of maintenance is difficult to judge; however, many areas have had delayed maintenance, especially the houses in the more remote locations such as Eastern Gothenburg and Angered.

Poseidon is the biggest public housing company in Gothenburg with many dwellings in all parts of Gothenburg. Currently, they are focusing on four major areas which include Hisingen, Angered and central Gothenburg. These areas have very different circumstances and needs and therefore each area is given different priorities. The maintenance plans are long-term and do not focus on the cosmetic aspects only- they consider the sustaining of the function of the building in their plans and within these are the plans for renovations. Common for both Familjebostäder and Poseidon is that they offer three packages of renovation, including a minimum level of what needs to be done and the additional options that the tenant can select themselves. Also, the rent level increase post-renovation can be paid following the rental stair model over a period of ten years.

Bostadsbolaget work with strategic maintenance and restore buildings area-wise. They have a strong collaboration between tenants, facilities managers and the renovation manager. Together, they assess the needs and the possibilities of the area, making their way of working unique from the other two housing companies. In their maintenance plans, they assess the status of different components so that the state of emergency can be seen and investments made in the right areas, i.e. where there is a greatest need for it. They also aim to minimise disturbances for the tenants living in the areas by grouping certain actions that need to take place by delaying them or preponing them. Bostadsbolaget have well-maintained buildings due to their continuous updates in the maintenance plans and therefore the needs and negative effects of renovations are not as extensive as those identified from Poseidon and Familjebostäder.

The buildings which are in greater need of total renovations are the ones that had most delayed maintenance, in the suburban areas where during the 90's, most of the vacant apartments existed. Therefore, the central apartments, in attractive locations do not need as much standard increases since they were well-maintained due to the non-vacancy.

The projects in the three different locations are of very different character and are managed in different ways depending on the housing company and their preferred strategies. The focus area for Familjebostäder is East Gothenburg and Majorna when the question of renovation arises. East Gothenburg is notorious for social issues where many people are of low income households. This makes the area more fragile to strategies that housing companies implement to manage their aging stock. Familjebostäder have goals in their social sustainability to create jobs for the tenants in their housing areas, which has been done in Tellusgatan where some tenants have been employed to work with the outdoor environments. They also aim to include tenants by allowing them to influence what is to be done in their building, even if certain actions need to take place. Similarly, Poseidon and Bostadsbolaget include tenant influence as a social sustainability goal, which can be seen in Näverlursgatan to some extent and more in Bostadsbolaget's Ekeströgatan where there is cooperation in place before renovation decisions are made.

Tellusgatan is an example of a deep renovation where everything had to be cleared out due to the delayed maintenance for many years. Therefore, the cost of renovation almost twice as much as the other two projects and the rent level is highest, if the cost per sqm is considered. Both Näverlursgatan and Ekeströgatan required less investments in their renovations, however, Näverlursgatan had to get the kitchens renovated too which has increased the costs of the renovation whilst Ekeströgatan did not have the similar requirement. It can also be seen that the renovation of Ekeströgatan has only done what was required and have not tried to increase the standard more than necessary. This is partially due to the building being well-maintained to begin with compared to the other two projects.

Incentives that Westin (2011) brought up, housing companies doing more than what is technically necessary, can be questioned since vast energy retrofitting is done to the cost that the tenant must pay, leading to negative social effects and supporting gentrification. All the companies have installed FTX-systems in their buildings which seems to be a natural measure when retrofitting buildings in Sweden. Additionally, all three projects have been additionally insulated of the facades and replacement of windows have been made. From a company perspective, the result is decreased operational costs and increased rental income, which may be necessary to satisfy the requirement of acting in a business-like way. The extent of the renovations can even then be questioned since only doing what is necessary is recommended by SABO (2009). All three companies have in combination with the replacement of piping systems carried out energy retrofits. The decrease in Tellusgatan is the smallest in theory compared to the other two projects and they have reached the value that is required after renovations (BBR, 2015). Some of the environmental incentives that the housing companies have, cannot be implemented due to the economic limitation, for example the installation of solar panels on the roof in Tellusgatan.

Ekeströgatan needed minimal input since the building had been well-maintained through the years compared to Näverlursgatan and Tellusgatan. This illustrates the Bostadsbolaget have worked well with their maintenance planning, which could also be recognised in the interview

with the renovation manager. Since the renovation required minimal input, the rent increase was at 23.7% based on the utility value which is far more less than 45.1% in Tellusgatan and 43% in Näverlursgatan. Then again, the deep renovation of Tellusgatan has most likely increased the standard of the apartments a lot compared to pre-renovation but to what extent was this necessary? Gentrification risks in Bergsjön is the highest compared to Lundby and Västra Frölunda, even if they have had increased standard and increased rents in their buildings as well.

The relocation rates are yet unknown in Tellusgatan, however at least a 14% relocation rate is expected (Boverket, 2014) and usually these households seek to areas where the rents are lower or homes which are yet to be renovated. In Näverlursgatan, there has been at least a 20% relocation rate which is more than the expected value. These tenants are given the possibility to move within the internal que system that Poseidon has within Västra Frölunda, allowing them to still reside in their current area. For Eketrägatan, some relocation rates may arise however they could be of natural reasons. Bostadsbolaget have a strong cooperation with the tenants and have established a good relationship with their tenants which also questions the risk of gentrification, even if a small rental increase takes place.

S2020 indicators well-followed by Familjebostäder, not by Poseidon and Bostadsbolaget; suggests that they work the most with social sustainability as they are defined by the municipality. It is a little contradicting that besides working the most with the social sustainability factors, that they will have the negative effects on the tenants. However, maybe this is the case only for this project that involves a deep renovation and the effects would have been different for an average renovation.

## 4 Conclusion and Outlook

The “best practice” can be associated with Bostadsbolaget whom work with strategic maintenance and planned renovations, that have the least negative effects on the tenants living in the area as could be seen from their case project. Another good strategy that Bostadsbolaget use is that they work with whole areas instead of single buildings, so that the whole area gets a standard increase and not the single building. The measures taken are then less since working with more buildings can mean that not many investments can be made in them.

The communication between facilities manager, tenant and renovation manager is unique and should be implemented by other housing companies in the strive to achieve “best practice”.

The most noticeable effect of the strategies that were used by the housing companies is the tenant having to relocate after the renovation has taken place due to the rent increase. This is also an effect that the three housing companies are aware of, however the “best practice” company seemed to work most actively with this issue by trying to balance their level of renovation and what the tenant will be able to pay for the changes.

The three companies have maintenance plans in place but the “best practice” company is working actively and strategically with these plans, trying to include collaboration with the tenants. In this way, the tenant feels that he/she has an influence on the renovations that will take place of their home.

Housing companies in Gothenburg work in a very different way even if the renovation methods used are similar in the renovation process. A simple framework for maintenance planning within public housing companies is lacking today as was stated by the housing companies.

If housing companies plan their maintenance similarly to the “best practice” company, it can lead to less extensive renovations, less rental increase and fewer relocations and risks for gentrification.

In this study, only public housing companies have been considered but in the future, a similar study for private housing companies can be carried out to map out how they work with their properties.

A limitation to this study is that similar housing companies owned by the same mother company are compared thus less applicable to represent all public housing companies. One suggestion would be to compare three housing companies in different cities of Sweden, better representing both the housing stock and the companies working with these buildings.

The housing companies could not give out detailed economic figures of the renovation project and therefore the profitability of each project could not be assessed meaning that the “best practice” company could have been different. In the future, access to such economic figures would be beneficial to give a fair judgement of the company with the best practice.

For the results to be better applicable, more housing companies should be assessed to find the “best practice” company method. Also, more case projects should be analysed to reveal the ambitions of the company translated into practice.

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## Appendix 1. Income in Gothenburg

	Population	Average income (SEK)
Gothenburg		269400
Angered	50629	186400
East Gothenburg	47478	192300
Örgryte/Härlanda	58345	290700
Centrum	59913	285400
Majorna-Linné	63441	283400
Askim-Frö-Högsbo	57372	293800
West Gothenburg	52546	330300
West Hisingen	53295	273300
Lundby	47754	268600
Norra Hisingen	48853	262800

The average annual income is illustrated in the figure below that shows that some of the case studies are from remote income locations such as Bergsjön which is in Eastern Gothenburg.

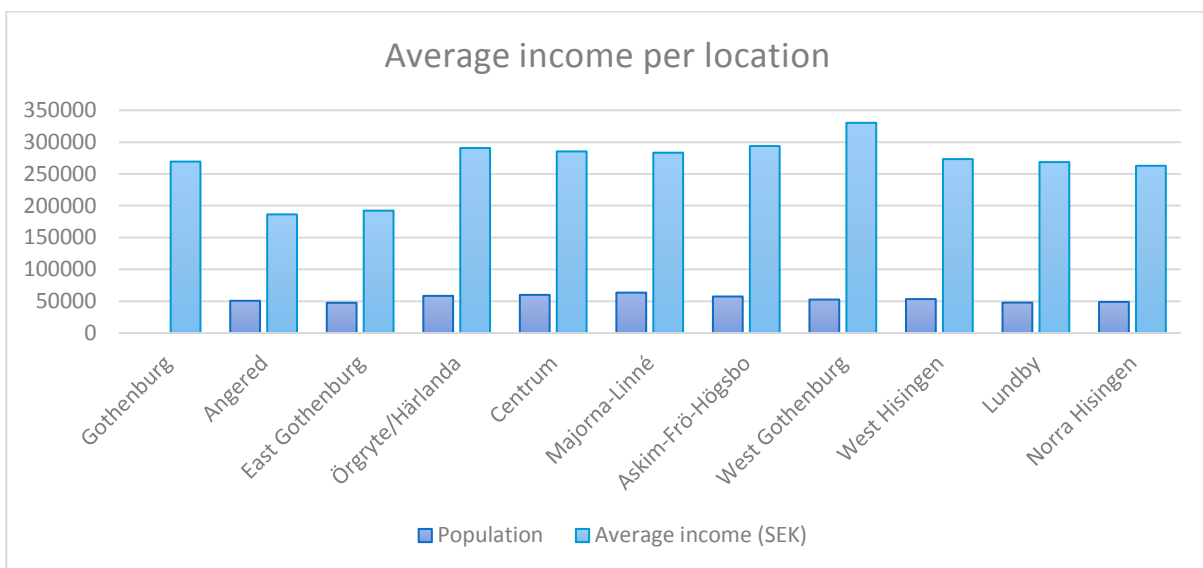


Figure 28. Average annual income per location in Gothenburg

The figure below shows the number of different tenure types and it can clearly be seen that Angered and the East of Gothenburg has substantially more public houses in comparison to other tenure types.

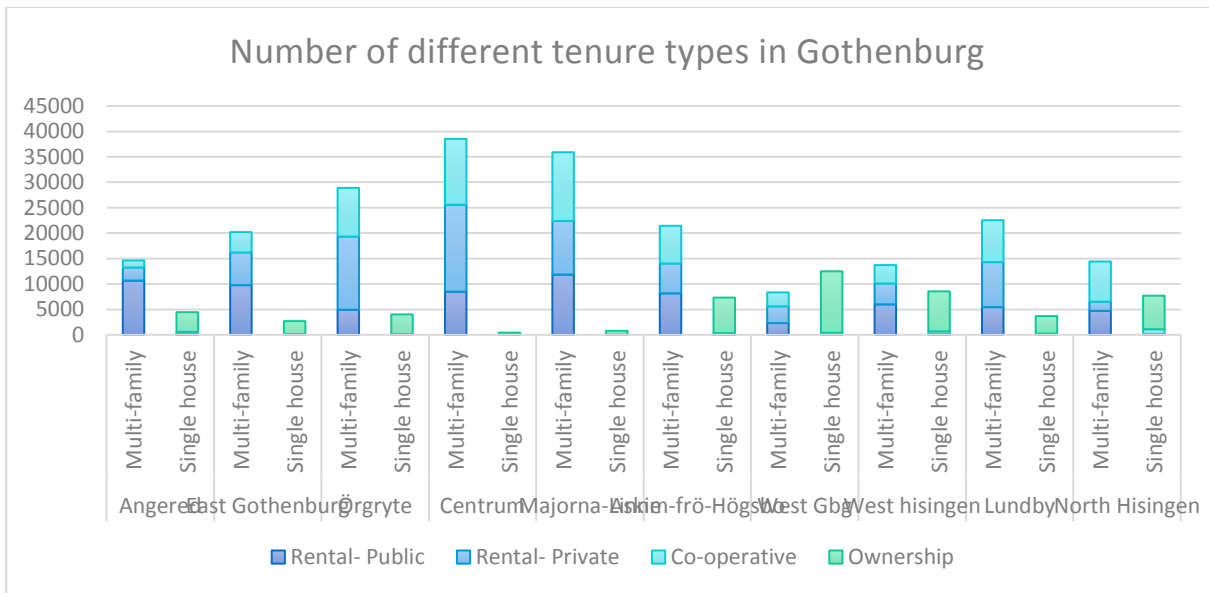


Figure 29. Number of different tenure types in Gothenburg



## Appendix 2. Interview Questions

Hur många byggnader har ni som behöver renoveras idag? När var de byggda och vad har ni beräknat för livslängd för dem?

*How many buildings do you feel need to be renovated today? When were they built and how have you calculated the service life for them?*

I vilket område är de flesta av era byggnader lokaliserade?

*In what areas are your buildings located?*

Vilken andel är miljonprogramshus?

*How many of your stock consists of million homes?*

Vad använder ni för renoveringsmetod eller process idag när ni planerar en renovering av en byggnad? (När det är dags för stambyte kör ni en större renovering eller..?)

*What renovation method do you use today when you plan a renovation?*

Vilka aspekter tar ni hänsyn till vid beslutsfattandet av renoveringen?

(hållbarhet-sociala, ekonomiska, miljö)

*What aspects do you consider when deciding on a renovation?*

Vilka faktorer är det som avgör om ni ska gå vidare med en renovering?

*What factors decide if you should go ahead with a renovation or not?*

Vad har ni för åtgärder planerade för att era byggnader ska bli mera energieffektiva med tanke på de skärpta energikraven?

*What actions do you have planned to assure that your buildings are more energy efficient considering the new laws on energy*

Hur försöker ni öka integrationen i era bostadsområden och/eller enskilda byggnader?

*How do you try to increase the integration of your housing areas and/or individual buildings?*

Hur ser era underhållsplaner ut?

*How do your maintenance plans look like?*

Gärna något exempel som vi kan gå igenom som visar hur ovanstående tillämpas i verkligheten.

*Could you provide an example project in which you illustrate how the above is realised?*