

Environmental Justice in the Post-industrial, Entrepreneurial City

A Look at Malmö's Built Environment

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This thesis is about environmental justice in the built space. Now let's unpack what that means.

Abstract

This thesis investigates environmental justice through the lens of the Sustainability Prism Model. Its purpose is to assess a post-industrial focus on environmental sustainability in the built environment using the four aspects of the Sustainability Prism: economy, ecology, equity, and livability. The study of eco-gentrification – the inequities that result as a consequence of the implementation of “eco”-programs and amenities – is facilitated by the livability aspect of the Prism which brings the other, more abstract concepts into the physical space.

By studying environmental justice via the Sustainability Prism, this research breaks down the concept of environmental justice into more manageable components. Thus, this thesis is also used to evaluate the use of the Sustainability Prism as a way to investigate environmental justice.

The city of Malmö in Sweden is chosen as a case study for its unique position as a neo-liberalising city located in historically welfare-focused state. This choice addresses the gap in environmental justice literature which has largely explored North American and non-Scandinavian European cities.

This thesis finds that policy-makers in industrial Malmö largely focused on the economy, equity, and livability aspects but the ecology aspect has now become a way to promote economic growth, promising equity as a by-product of a strong economy. In present-day Malmö, livability is being used to promote housing developments to industry and residents, while advanced environmental solutions are being used in flagship projects.

Using the Sustainability Prism Model allowed the investigation of environmental justice to be more accessible. It also demonstrated the nuances between the aspects as the distinction between livability and ecology was made where the two aspects may sometimes be conflated. This distinction is important to understand to better grasp the root of eco-gentrification in the urban environment.

Keywords: environmental justice; eco-gentrification; Sustainability Prism Model; post-industrial city

Executive Summary

Background and Problem Definition

Research concerning environmental justice in the city has historically focused on the negative consequences of toxic waste sites and polluted areas. Recently, however, the discussion has shifted to the study of the negative consequences of urban greening projects, such as park creation, and programs focused on environmental sustainability. The environmental justice literature discusses the “urban sustainability fix” (While *et al.*, 2004), critiquing urban regeneration programs that use environmental sustainability and “eco”-strategies but lead to negative unintended consequences.

One such consequence is termed as eco-gentrification. It describes the marginalization and displacement of residents that occurs as a result of installation of physical spaces like parks and initiatives like green development programs – what is termed as green amenities (Eckerd, Kim, & Campbell, 2017; Anguelovski, 2016; Debats, 2016; Lashley, 2016). The effects of pushing forward an environmentally sustainable agenda are described for cities like New York, Toronto, and Barcelona (Darren, 2011; Bunce, 2009; Dooling, 2009). These once industrial economies have undergone urban regeneration strategies that are based on promoting a “green” and “clean” image (Dannestam, 2009). However, these programs can also reinforce existing power hierarchies, leading to societal inequities.

This thesis takes the case of Malmö, the third largest city in Sweden, as an example of a place that has undergone a post-industrial urban regeneration strategy focused on environmental sustainability. Through projects like Bo01 and Augustenborg Eco-city, Malmö has cemented itself as a leader in environmental solutions. The city has used this idea to sell itself as an appealing place for business investment and an attractive place in which to live (Anguelovski, 2016; Dannestam, 2009; Jamison, 2008)). Unfortunately, socioeconomic polarisation persists within the city (Scarpa 2016; Scarpa, 2015; Salonen, 2012). The city of Malmö is an interesting case study because it is located in what has traditionally been a welfare state. Thus, a focus on equity would typically be part of the core policy. In this way, the case of Malmö adds the Scandinavian example to the environmental justice literature – a neo-liberalising city that has transitioned from a heavily welfare-focused one (Baeten, 2017; Baeten, 2012).

In this thesis, environmental justice is studied through the lens of the Sustainability Prism, a tool developed in the urban planning literature to investigate the conflicts that occur between four aspects: economy, ecology, equity, and livability. These four aspects are characterized as points on a prism with lines denoting the trade-offs between them (Campbell, 1996; Berke, 2002; Godschalk, 2004).

Purpose Statement and Research Questions

This thesis studies what environmental justice looks like in a city that has undergone a transformation from an industrial economy to what is termed a knowledge-based or entrepreneurial city (Madureira, 2014; Dannestam, 2009). Environmental justice is considered an issue in Malmö because city policy-makers have used environmental sustainability to market itself to investors and the creative class, sometimes at the expense of equity in the city (Baeten, 2012; Jamison, 2008). Thus, this thesis investigates sustainability measures in residential housing – used as a proxy for green amenities – to understand their impact on environmental justice in present-day Malmö.

The Sustainability Prism is used to investigate the weight that policy-makers have given the four aspects as the city transitioned from industrial to post-industrial. Using the Sustainability Prism

as a tool is useful because it breaks environmental justice into more manageable components. Further, it touches upon values that have been significant in Malmö's transition to a knowledge-based city. The economy's emphasis has shifted as ecology-related measures are used to market the city. The city's stance on equity has shifted as neo-liberalism has become a more dominant guiding city philosophy. Finally, livability is the newest addition to the Prism, bringing the other aspects into the built space. Its inclusion allows us to study the effects of physical green amenities as part of a broader investigation of environmental justice.

The two research questions this thesis answers are:

1. What has been the impact on environmental justice – as seen through the lens of Malmö's residential developments – as Malmö has transitioned from an industrial city to a knowledge city?
2. How do present-day housing developments in Malmö and use of green amenities impact environmental justice in the city?

Research Design and Methodology

The first RQ was answered by analysing Malmö's trajectory from industrial city to present-day urban area via the Sustainability Prism. The four aspects were followed over time to ultimately provide context and a setting for the second RQ.

The second RQ was answered by assessing the implementation and communication of three categories of sustainability measures that were used as proxies for green amenities – energy consumption, mobility, and green roofs – in residential housing built by Malmö's municipal housing company, MKB. Implementation and communication of these green amenities were studied due to their potential to affect the four aspects of the Sustainability Prism.

Data was acquired by interviewing project leaders at MKB. Interviews with stakeholders at MKB and in the municipality were conducted. Site visits provided additional contextual information. These data were layered and triangulated to gain a better sense of environmental justice in the city today.

Findings RQ1: What has been the impact on environmental justice – as seen through the lens of Malmö's residential developments – as Malmö has transitioned from an industrial city to a knowledge city?

By looking at the history of Malmö through the lens of Sustainability Prism, this thesis laid out the contextualized present-day issues in past actions. In particular, unpacking environmental justice through the Sustainability Prism revealed how the means of economy – the shipping industry – pushed the ecology aspect to the background until the closing of the shipyard in the 1980's and recession of the 1970's forced the city to reinvent itself by giving the ecology aspect more primacy. The Miljonprogrammet project in the 1960's and 1970's attempted to combine equity and livability in modernised housing that was accessible to the masses. Unfortunately, the housing soon came to be seen as outdated. Many residents moved out and soon the housing became concentrated with lower income populations. Poor energy standards and its oppressive uniformity have made it seem less liveable and the housing is in need of renovation.

Analysing Malmö's history through the Sustainability Prism clearly demonstrates the evolution of the ecology aspect as it gained significance over time. Meanwhile, analysis of the Miljonprogrammet housing demonstrates the close link between livability and equity. It also

shows how Miljonprogrammet housing is vulnerable to environmental justice issues due to its outdated environmental standards and high concentration of low-income residents. Ultimately, this analysis presents Malmö's current setting: a city that uses ecology-related factors to grow its economy and one that has encountered issues in equity in housing, partly due to the fall of livability.

Findings RQ2: How do present-day housing developments in Malmö and use of green amenities impact environmental justice in the city?

Studying the second RQ revealed the distinction between equity and livability in Malmö's built environment. Although flagship projects like Bo01 and more recent innovative projects like Greenhouse have used advanced environmental solutions, housing projects that are more representative of typical rental housing are not as ambitious in their environmental solutions. Instead of using the ecology aspect as a marketing tool as in the Bo01 project, these projects emphasize the livability aspect as a way to appeal to investors and residents. This can be seen in the way descriptions limit emphasis on environmental solutions, instead focusing on the multi-purposeness of the residential space. This has its own consequences for equity, but should not fall under the classing of eco-gentrification. The sustainability measures studied in this thesis were not distinctive enough to be used as a gentrifying tool and, ultimately, may not fall under the categorization of green amenities.

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1 Introduction

1.1 Background

As urban areas expand, transforming the environment, many cities have become focused on developing sustainability strategies for the growing urban populations. Parks and green areas, renewable energy targets, novel mobility options, and rethinking of waste processes are just some of the aspects to which policy makers have been paying increasing attention. These greening projects may be ways for cities to reach national air pollution or emissions targets but they also work to make cities more attractive places in which to live. Making urban areas environmentally sustainable has positive health and social impacts and greener cities are more hospitable places for residents (URBACT, 2015; Nilsson *et al.*, 2014; Rasoolimanesh, 2012; European Commission 2010; Chiesura, 2004).

Social issues and environmental problems are tightly tied together, often pulling one another and exacerbating each other. Scholars describe the study of this tension as environmental justice. Environmental justice has historically looked at the disproportionate inequalities that result from the placement of polluting industries or toxic waste in urban areas. Recently, however, the literature has turned to the study of green amenities like parks and green development programs. These greening measures have the potential to change the physical and social fabric of an urban area as much as disamenities like toxic waste sites or polluted areas. Much of this recent literature has investigated cases in North America and Europe where urban areas have pushed forward environmental programs with sometimes unintended societal consequences (Eckerd, Kim, & Campbell, 2017; Angelovski, 2016; Debats, 2016; Lashley, 2016).

The aim of this thesis is to explore environmental justice – and the impact of green amenities – in a new context: a post-industrial city in Scandinavia. Green amenities have previously been studied in the post-industrial landscape in cities such as Toronto, New York, Portland, and some European cities such as Manchester, Leeds, and Barcelona. However, the Scandinavian context is new and presents an additional element: the area’s traditional image as a welfare state that values equity.

In their post-industrial transition, cities often present themselves as centres of clean industries that rely on human capital. In this way, they are able to attract new business and the “creative class.” This changing focus is sometimes accompanied by eco-programs that aim to present the city as “clean” and “green.” Impacts of these programs depend on how they are presented and whether they are equitably distributed (Madureira, 2014; Dannestam, 2009).

The post-industrial city chosen as a case study in this thesis is Malmö, Sweden’s third largest city located in the southern tip of the country. Sweden, often considered by the West to be a model welfare state, has also in recent years become prone to the tension between societal strain and forward-looking environmental programs as it becomes increasingly market-dependent. Once an industrial city, Malmö has reimagined itself as attractive to different industries and people; it projects itself as a “clean” and “green” city. This transition has been aided by a number of sustainability-focused projects (Dannestam, 2009; Jamison, 2008; Mukhtar-Landgren, 2008).

These projects have shown the ability to exclude certain populations from the planning (Gutierrez, 2015). Segregation among Malmö's neighbourhoods has frequently appeared in academic literature. Foreign-born populations and the less affluent are concentrated in pockets in the city. Meanwhile, policy-makers attempt to appeal to wealthier Swedish-born residents to fill the city's new development projects (Scarpa 2016; Scarpa, 2015; Salonen, 2012). Gradually, equity has become a greater concern and has even been studied by the Commission for a Socially Sustainable Malmö (Commission for a Socially Sustainable Malmö, 2013).

This thesis investigates environmental justice in the Scandinavian context, with a focus on eco-gentrification – the unintended negative consequences of programs focused on environmental sustainability – in the built environment.

1.2 Problem definition

The problem of equity and environmental justice is often discussed in conjunction with urban green development. Cities adopt environmental plans in order to meet climate targets, become more cost-effective, and to make dense urban areas more habitable, but the benefits are not always distributed evenly among residents. Socioeconomic boundaries creep in, dividing cities by income, race, or both. Environmental policy must address these differences in order to not exacerbate them.

Environmental justice is the study of the inequalities that are ignored and are further entrenched when policy-makers make decisions about the siting of disamenities, like toxic waste sites or polluted areas, and green amenities, such as parks, gardens, and greening measures in urban areas (Eckerd, Kim, & Campbell, 2017; Anguelovski, 2016; Debats, 2016; Lashley, 2016). Much research has been done on the distribution of polluting industries in relation to urban inequalities, as well as impact of lack of green spaces or, on the other hand, the preponderance of toxic or dirty land uses in poorer neighbourhoods. However, the study of the effects of these disamenities on inequality has expanded into the study of green amenities – parks, gardens, and greening measures in urban areas. Green amenities have gentrifying potential as they can change neighbourhood dynamics by upscaling them and bringing in wealthier residents into the area. The result may include a reshaped physical landscape as well as a reshaped social landscape (Eckerd, Kim, & Campbell, 2017; Anguelovski, 2016; Pearsall & Anguelovski, 2016).

Environmental justice, often the work of activists, is also the work of urban managers. Whether urban environmental programs are created and catered to all segments of the urban population can determine whether urban residents have equal opportunities to lead healthier lives and make a difference in the environmental impact they have in their community. Urban managers, as I refer to those who have influence in the planning of the city, aim to harmonise social sustainability and environmental sustainability targets, but conflicts continue to exist.

Several scholars have attempted to show these conflicts by discussing them in terms of the Sustainability Prism. The Prism, described in greater detail in Chapter 2, shows the trade-offs between goals relating to the economy, ecology, equity, and livability. These four aspects are presented as points in a prism with lines denoting the conflicts between each set of two. This Prism becomes a valuable tool for evaluating environmental justice as the tension between these four aspects that urban policy makers must successfully balance in order to achieve environmental justice in the city. It also helps break down environmental justice into more

accessible components for investigation. This thesis investigates environmental justice in the green amenities by using the Prism's four aspects.

It is clear that the impact of urban greening strategies is multi-faceted and complex. Environmental justice scholars often describe the inequities that result from disamenities and, now, green amenities. However, in the case of green amenities the inequities may be unintentional: the desire to provide greater access to parks or environmental programs has gentrifying potential that may not be premeditated. In terms of the aforementioned Prism, this can be described as the conflict between equity and livability.

The choice of Malmö addresses the gap in recent environmental justice literature regarding the study of the impacts of green amenities – especially in urban areas not located in North America or non-Scandinavian Europe. Malmö's socioeconomic polarization combined with its strong interest in being environmentally sustainable sets it up as an interesting case study for observing the impact of greening initiatives on society. Its position as an increasingly neo-liberal city in a country that has historically been focused on being equitable for all residents makes it especially compelling. Being a bearer of benefits for the nation's residents has been historically woven into Sweden's policies. Understanding how much of this mindset remains in the post-industrial, neo-liberalising environment adds a new perspective to the environmental justice literature.

The green amenity to be studied in this thesis is sustainability measures incorporated into residential housing. Studying sustainability measures as a green amenity is fitting because sustainability measures are integrated into housing to decrease the environmental footprint. At the same time, these measures can act as a premium on rent, raising prices and making housing unaffordable. These effects are similar to those that result from more traditional green amenities such as parks.

In terms of the Sustainability Prism, sustainability measures in housing can serve as a method for studying the evenness of planning across the city as they touch every aspect of the Sustainability Prism: they impact ecology by reducing the environmental footprint, spur economic growth by pushing forward new ideas in environmental solutions, create liveable structures for residents of the city, and relate to equity in how they are distributed to various subpopulations in the city. In Sweden, housing was once considered a “right for all” with an ambitious program that added one million new homes for residents in the 1960's and 1970's called Miljonprogrammet (Wittrock, 2011). More recently, however, housing in Sweden has become scarcer and has fallen under the influence of market.

In this thesis, the implementation of sustainability measures is studied in the context of residential buildings across Malmö's districts, with comparisons between residential buildings across the city's socioeconomic areas. The actors in the city that contribute to developing the built environment – private real estate companies, the city's planning department, and the municipal housing company, MKB – have shown their commitment to building sustainably through projects like Bo01, Augustenborg Eco-city, and others. Whether they are able to address social sustainability issues simultaneously is of central relevance to the environmental justice discussion.

The sustainability measures to be studied in this thesis – those related to energy efficiency and mobility – relate to how well residents are able to change their behaviour, their impact on the environment, and their usefulness in climate adaptation. By integrating energy saving

technologies into residential complexes and providing options such as car-pooling, urban managers are providing residents with tools for reducing their environmental impact. Creating space for green surfaces like green roofs can offer solutions for storm water runoff and provide an aesthetically pleasing sight for residents. These measures also have potential for increasing rent and setting a premium for living in an area, making them a suitable proxy for green amenities.

Environmental justice comes into focus through the study of the distributive and gentrifying qualities of these measures. Distribution of environmental measures affects the access that residents have to tools that can reduce their environmental footprint. Thus, wide-ranging access is important – but it also has gentrifying potential as environmental programs may change the social dynamics of a neighbourhood through up-levelling of industry and rents. This can lead to displacement of lower income populations. Extra energy saving measures, mobility options, and green roofs may translate into a premium, leading to higher rents and appealing to a wealthier incoming population. This is especially relevant to communication of sustainability measures as more well-off residents may see them as an attractive addition to their housing that they can afford.

This thesis recognizes the complexity of implementing environmental initiatives. Thus, environmental justice is broken down into manageable components as guided by the Sustainability Prism. The research has the ability to fill gaps in environmental justice literature by analysing Malmö's trajectory to a knowledge city through the lens of economy, ecology, equity, and livability, as well as present-day consequences of green amenities.

1.3 Objective and research questions

The objective of this research is to gain an understanding of what environmental justice looks like, how it has changed, and what the future may look like in a neo-liberalising city that is located in a historically welfare-focused nation. This thesis explores this question by looking at the built environment in industrial Malmö and the post-industrial, “knowledge city” of Malmö.

Malmö represents a broader group of cities which use sustainability as a new vision for a transition from identifying as an industrial city. The case of Malmö is interesting due to the city's increasing focus on building a sustainable image over the past two decades. This focus has come with a number of projects introducing innovative environmental solutions. The Bo01 project in Malmö's Western Harbour is a classic example of the city building its “sustainability brand” and presenting its environmental strategy to new residents and investors alike; built in 2001 as a housing exposition, its success has encouraged further sustainably minded growth and innovation in the region (Madureira, 2014; Dannestam, 2009). The city has strengthened its image as a hub of sustainable development through other projects as well, including the Hyllie development project, a green multi-purpose development that has attracted business and wealthier residents, and Augustenborg Eco-city, a green redevelopment of a neighbourhood in Malmö conducted with the intention of implementing environmental solutions and rejuvenating the community (Baeten, 2012). These projects have helped Malmö present itself as a clean and green city while also attracting new industries focused on human capital. At the same time, Malmö has had more pronounced levels of income segregation following the economic recession in the early 1990s and experienced big increases in income inequality over the course of 2001-2010 compared to larger Swedish cities like Gothenburg and Stockholm (Andersson & Hedman, 2016; Scarpa, 2016).

The core of the thesis lies in analysing environmental justice in the context of housing development through the four aspects of the Sustainability Prism mentioned in the earlier section.

To study this question, I pose two more specific research questions:

1. What has been the impact on environmental justice – as seen through the lens of Malmö’s residential developments – as Malmö has transitioned from an industrial city to a knowledge city?
2. How do present-day housing developments in Malmö and use of green amenities impact environmental justice in the city?

The first question is context setting and shows how environmental justice issues have played out in the city of Malmö. Understanding environmental justice in the Scandinavian city that has become increasingly neo-liberal while promoting a green image is a new addition to the environmental justice scholarship. The question is studied by unpacking environmental justice into the interplay of four aspects: economy, ecology, livability, and equity. Analysing these four aspects in the context of a changing Malmö provides background for the current state of the city and environmental justice issues.

The second question is a more in-depth assessment of the possibilities of eco-gentrification that may result from sustainability measures in housing. Municipal housing was chosen due to the close relationship between city policy-makers and the municipal housing company; the city’s sustainability program can be seen as diffusing into the policies of the municipal housing company, MKB.

The second RQ is further broken down into more specific sub-questions as shown in Figure 1-1. Sustainability measures in municipal housing projects are used as a proxy for green amenities in this thesis.

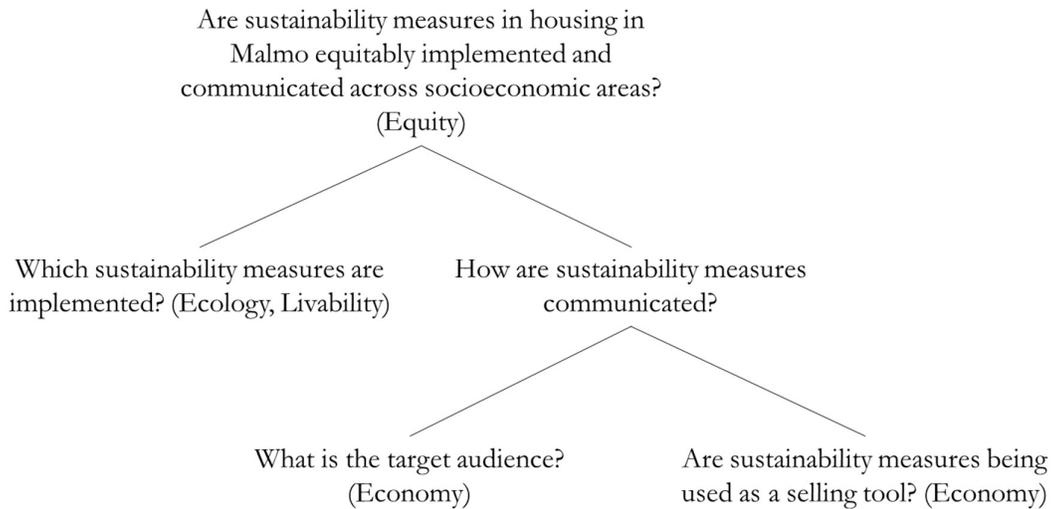


Figure 1-1 Sub-questions to RQ2

Each of the sub-questions adds information to understanding whether green amenities in current housing developments have an impact on environmental justice. This is assessed by analysing implementation and communication of sustainability standards in municipal housing. Implementation and communication, as seen in Figure 1-1, relate to the four aspects of equity, ecology, livability, and economy that make up the Sustainability Prism. The Sustainability Prism, briefly described in 1.2 and described in more depth in Chapter 2 is used to break down environmental justice into four contending categories of values. It makes the broad concept more accessible by allowing us to inspect each aspect and its relationship with the other aspects.

The ways in which communication and implementation of sustainability measures affects the four aspects of the Sustainability Prism is described in Chapter 2.

1.4 Scope and limitations

The study of environmental justice is conducted through the lens of the Sustainability Prism. While this framework allows for more manageable analysis of the larger concept, it has gaps in its ability to assess the evolution of environmental justice. The Sustainability Prism can be applied as a framework to a certain period in time and misses historical and cultural features. These are largely captured by the other four aspects, but it is important to note this initial limitation.

This research is limited to the study of industrial and post-industrial Malmö with a strong focus on the city's economic and environmental activities from the 1960's and onward. It is important to note that Malmö's unique housing market, societal make-up, economy, and historical context all play a role in influencing environmental justice in the city. This research limits discussion of these aspects to what is most relevant to the discussion in the present day and what is included as a component of the Sustainability Prism. Further, the built environment is emphasized throughout with minimal weight placed on policy and legislation.

Malmö's five districts fall within the scope of this study. Income inequality exists in the city but, while Malmö's districts in the east and southeast are considered to be economically worse off compared to the western side of the city, they are by no means poverty stricken in the global context. Thus, conclusions from this study may not be applicable to a more global context. However, Malmö, as a post-industrial city transitioning into a "knowledge city," has the potential to add to the environmental justice literature due to its location in Scandinavia and historic welfare tendencies.

Further, in its investigation of green amenities in the present day, this thesis investigates six new housing projects located largely in two areas of the city and only those belonging to the municipal housing company, MKB. While the choice is justified and the chosen projects are meant to be representative, it certainly does not reflect a complete view of the housing market in Malmö.

The choice of the three sustainability measures to be studied in the green amenities section is based in MKB's current focus areas, but the measures are not fully illustrative of the scope of sustainability measures that could be developed nor of the ones that have gentrifying potential. In addition, the decision-making process behind implementation and communication of these measures is a result of many actors and cannot be solely attributed to MKB or the city.

It is important to note that this research was conducted by a non-Swede. Minimal understanding of the language and lack of historical knowledge necessitated extensive information gathering and ample use of Google Translate. Results are valid to the extent that pure meaning is not lost based on translation or lack of cultural and historical context. At the same time, the outsider perspective is valuable to gain a critical and objective view on the Scandinavian setting.

1.5 Target audience

This thesis is relevant to multiple stakeholders, including policy makers in the Malmö municipality and the stakeholders at Malmö's municipal housing company, MKB. The research can serve to provide recommendations for these parties when it comes to disseminating sustainability measures to households across the city.

For *municipality policy-makers*, the research can indicate how well the city's sustainability strategy is spreading across socioeconomic areas. They may begin to understand whether the neo-liberal branding of Malmö has had an impact on the way environmentally friendly measures are spread across residents and whether green amenities have gentrifying potential.

For *stakeholders at MKB*, the research offer insight into whether environmental practices in housing developments are successful across socioeconomic boundaries. Has equity in diffusing sustainability measures been reached?

For *researchers*, this investigation adds to the discussion of environmental justice in a Nordic context by studying equity in sustainability measure in rental housing. Polarization and gentrification in Malmö has been previously studied, but not through the lens of greening measures in housing. Moreover, this research investigates the value of using the Sustainability Prism Model as a tool to assess environmental justice.

This project is also relevant to the work of the *Malmö Innovation Arena*, which aims to “use physical urban development processes to stimulate, develop, and disseminate innovation to create a more sustainable city and to create growth.” This thesis highlights the challenges that Malmö's policy makers and researchers face, as well as issues that may need to be addressed as the Malmö Innovation Arena project continues.

1.6 Thesis outline

Chapter 1 has presented background and the position of the author as to why further research is needed to understand environmental justice – through the lens of the Sustainability Prism Model – in the city of Malmö. The main research questions, along with scope, limitations, and target audience were outlined.

Chapter 2 presents ideas and theoretical framework (Sustainability Prism Model) that are necessary to understand the research. It collects the main relevant points from previous studies on urban planning and ties in environmental justice literature, especially as it relates to the built environment. Context for chosen sustainability measures is also given.

Chapter 3 presents Malmö as the centre of focus of this thesis. By showing that Malmö has transitioned from an industrial economy to a knowledge city through use of sustainability

initiatives, it presents the city as a stage for understanding polarization in the age of neo-liberalism. Further, the housing market is described in Malmö and in Sweden.

Chapter 4 describes the research methodology used to answer the two main RQ. It justifies choice of informants, presents objectives of the interviews, and describes how green amenities were studied in present-day Malmö.

Chapter 5 triangulates Malmö's history, data from housing project sites, and the results from interviews with other evidence in an analysis of the findings. The analysis heavily uses the Sustainability Prism Model.

Chapter 6 is an extended discussion of results and presents them in the context of a broader discussion of environmental justice in Malmö.

Chapter 7 concludes the thesis and explains implications of the study. Opportunities for further research are described.

2 Theoretical Framework

This chapter is a review of the environmental justice scholarship and showcases recent concerns surrounding eco-gentrification. The literature review provides background on why studying the often-competing goals of economic growth, environmental preservation, and equity are important and provides justification for studying environmental justice issues through the lens of the Sustainability Prism Model.

2.1 What is environmental justice?

The environmental justice discourse centres around the procedural and distributive inequities that occur as public and private actors make decisions around green amenities and disamenities. Lashley (2016) defines environmental justice as bringing together “historical, social, economic, and ecological dimensions of environmental problems to demonstrate how environmental inequalities are the outcome of historical and present day discriminatory practices and structural inequalities” (Lashley, 2016: 189). Historically, environmental justice has focused on the implications of political processes and resultant siting of disamenities like toxic waste sites, hazardous facilities, and polluted areas. This research was significant given the frequent overlap of such disamenities with areas largely populated by minorities and poorer socioeconomic classes (Eckerd, Kim, & Campbell, 2017; Debats, 2016). In effect, siting of disamenities entrenches existing structural inequalities as poorer areas are affected by the externalities of hazardous and polluting infrastructure.

Lately, however, the literature has turned to the study of environmental justice surrounding green amenities. Eckerd, Kim, & Campbell (2017) write that the environmental justice scholarship now includes the effects of climate change, regulatory processes, and spatial interactions in its scope. Locally unwanted land uses (LULUs), once denoting toxic waste sites and contaminating structures, have now been extended to include green amenities such as urban green spaces and structures. Marginalized neighbourhoods could benefit from these amenities, but they could also face unwanted consequences such as displacement of residents as rent prices rise and wealthier populations, attracted to the environmental amenities, move in. Ecological gentrification has entered the environmental justice scholarship as seen in cases in New York, Barcelona, Austin, and Portland to name a few (Anguelovski, 2016; Gould & Lewis, 2012; Checker, 2011; Dooling, 2009).

2.2 Environmental justice in the neo-liberal city

The relevance of environmental justice as a lens through which to view environmental amenities has increased in importance as cities have begun to use sustainability as a way to attract investment and the creative class into their space. This is especially a trend in post-industrial cities which attempt to reinvent themselves in the global market. Municipalities now “develop sustainability strategies that are designed to boost their competitive advantage” (Tretter, 2013: 297). However, economic endeavours often cloud sustainability efforts and take advantage of power hierarchies, leaving certain populations marginalized and vulnerable. Even when economic and environmental growth promises a trickle-down effect, inequality in distribution and access continues to exist (Pearsall & Anguelovski, 2016).

The desire to attract investment is in line with the neo-liberalisation of cities. Neo-liberalisation in cities encompasses the increasing reliance of policy makers on private parties and market mechanisms for economic growth. Urban managers strive to appeal to business in order to

transform their urban areas. One of the ways that post-industrial cities make this appeal is by projecting an image of a city with “clean” industries that rely on human capital. Sustainability and urban greening has thus become a path for post-industrial cities to present themselves as clean and green urban areas (Dannestam, 2009).

A result of the tightening integration of the economy and the environment has been a lessened focus on issues of equity. Jonas and While (2007) ask, “Under what conditions can urban managers promote competitive and liveable cities?” (Jonas and While, 2007: 130). Tretter (2013) writes about the difference between environmental sustainability and just sustainability. The former focuses on the environment and non-human species while the latter presents ecological problems as a civil rights issue involving people and the spaces they occupy and interact with. This “just sustainability” has been overlooked as urban areas strive to be more competitive in the global market.

Concerns over equity are partly driven by the way sustainability has been propagated as a value-neutral concept in cities’ neo-liberal agendas. Rosol (2013) describes how sustainability was used as a way to sell an Eco-density program in the city of Vancouver – a program that focused on making the city “healthy, clean, and green” but lacked the critical participatory element that would make it equitable for all. By using “eco” to sell a program that promoted densification and related consequences, the program entrenched the common view that greening is post-political, post-democratic, and technocratic, inhibiting discussion of the politics of the environment (Swyngedouw, 2007). The “urban sustainability fix” has become a way for cities to create more habitable environments for residents especially in post-industrial environments – yet this agenda does not always recognize all residents and parts of the city equally (While *et al.*, 2004).

Tretter (2013) uses the example of Austin, Texas as a place that has used its resources – and newfound eco-image – to distinguish itself and attract industrial development and educated, high-skilled workers. Environmental sustainability in the city has become a central tenet to gaining investment and increasing the city’s competitiveness. At the same time, social issues may have become lost as ecological and economic concerns are touted first and foremost.

Austin is just one example of a place that has attempted to merge the entrepreneurial agenda with the sustainability agenda, using the latter as a selling point to facilitate the former. Jonas and While (2007) write about the blurring of entrepreneurialism and sustainability in the context of Barcelona, a city that has undergone its own post-industrial transition to a “smart city.” Unfortunately, “sustainability is often conflated with environment or ecology, thereby obscuring the social dimension” (Jonas and While, 2007: 125).

In an attempt to account for the multi-dimensionality of urban spaces, environmental justice and urban planning literature often talks about the implications of planning for the economy, environment, and equity. Recent literature on urban planning and environmental justice pushes green city planning away from the apolitical, value-free mask it wears. This thesis assesses the environmental justice discussion through the Sustainability Prism, bringing it more fully into the interactions between people and the physical space. This is a valuable addition as many environmental sustainability initiatives take the form of visible “greening” efforts implemented into buildings and blocks.

2.3 Sustainability Prism Model

Authors such as Campbell (1996), Berke (2002), and Godschalk (2004) have attempted to synthesize the study of the environment within social theory by proposing and revising the Sustainability Prism Model, a useful way for city planners to think about their actions in creating a habitable and sustainable urban space. The Prism, seen in Figure 2-1, relies on linkages between equity, economy, ecology and has been updated to include livability; it shows the “value conflicts between livability and sustainability visions” that result as planners balance their objectives for the city (Godschalk, 2004: 9). These conflicts emphasize the difficult balance that planners strike when they try to accommodate social and environmental sustainability.

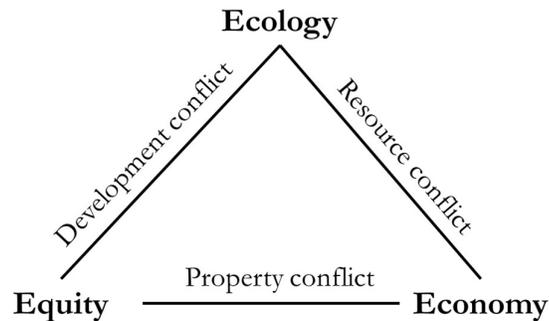


Figure 2-1 Sustainability Prism
Source: Adapted from Campbell (1996)

The conflicts between the three original “E”s can be defined as the following (Campbell, 1996):

- **Property conflict:** Contending claims for property by private and public parties and use of property for private versus public good
- **Resource conflict:** Conflict between desire to consume natural resources versus preservation of resources for future consumption
- **Development conflict:** Competing needs to improve standard of living for the urban area’s poorest while protecting and preserving natural resources

Godschalk (2004) introduces the concept of livability into the prism which he defines as “placemaking” – the “land use design aspects, ranging down to the micro scale of the block, street, and building, as well as up to the macro scale of the city, metropolis, and region” (Godschalk, 2004: 6). According to Godschalk (2004), the addition of livability into the classic Sustainability Prism Model, moves the sustainable planning discussion away from 2-D conceptual aspects like the economy, ecology, and equity to 3-D aspects like the creation and use of public space, movement in urban settings, and building design. With the inclusion of livability, planning visions move away from a simpler vision of sustainable development that takes into account economy, ecology, and equity to one that also attempts to balance livability with the existing concepts.

This adds three new conflicts to the Prism: growth management conflict, green cities conflict, and gentrification conflict as seen in Figure 2-2 (Godschalk, 2004):

- **Growth management conflict:** Competing beliefs whether market-based development can provide a liveable environment
- **Green cities conflict:** Contending views of primary importance of natural versus built environments
- **Gentrification conflict:** Competing desire of preservation of current neighbourhoods for current populations versus redevelopment for attracting wealthier classes

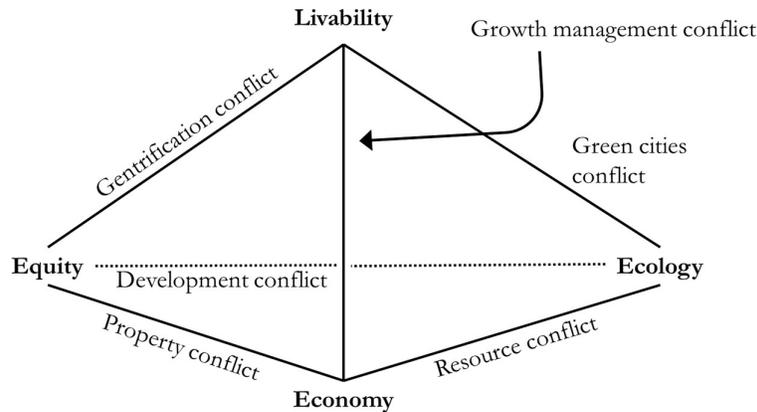


Figure 2-2 Sustainability Prism with addition of livability
Source: Adapted from Godschalk (2004)

These three new conflicts are particularly relevant to this study as they strongly demonstrate the conflict of the neo-liberal city. As the neo-liberal city roots its growth in the market mechanism, the primacy of nature and social issues wears away. An urban area may attempt to solve the green cities conflict by merging its environmental and development targets, using sustainability as a competitive strategy to market itself as an attractive place for business and living (as in the case of Malmö to be described in Chapter 3). Gentrification conflict is central to this research as it describes the push and pull of equity and new development.

Studying environmental justice through the Sustainability Prism helps break down the issues that are present in the city. The livability aspect, in particular, is a useful addition as it contextualizes economic, ecological, and equity goals in the built environment. While city policies can be critiqued using the original three aspects, the livability aspect brings these intangible concepts to a physical space that people occupy. In doing so, conflicts in the urban environment become more palpable in a new dimension.

It is important to note that using the Sustainability Prism as a way to study environmental justice has its limitations. According to environmental justice literature, present-day social and environmental issues are results of an extended timeline that includes historical and social factors. Policies that were implemented in the past and a place's culture and notions are significant factors in determining the environmental justice issues faced today. The Sustainability Prism has a lesser focus on these historic and cultural implications. However, some of these features can be studied through the other aspects of the Sustainability Prism.

The advantage of the Sustainability Prism is its ability to break environmental justice into more approachable ideas. In this thesis, broad concepts like economic sustainability, environmental sustainability, and social sustainability that make up environmental justice are broken down into the Prism's aspects. It would be too simplistic to attribute each aspect to one category (e.g. economy to economic sustainability) as each broad category is made up of interactions between all aspects. For example, economic sustainability can be easily described by the economy aspect, but it also encompasses interactions with equity as policy makers may attempt to diminish economic inequality, ecology as policy makers may use environmental sustainability as a branding tool, and livability as new developments attract new residents and investors. This thesis investigates the interaction of the various aspects.

2.4 Eco-gentrification

Gentrification conflict has been the study of many environmental justice scholars in recent years. A focus on sustainability in view of neo-liberalist policies has led to the study of eco-gentrification described by many authors (Wolch, Byrne, Newell, 2014; Checker, 2011; Darren, 2011; Bunce, 2009; Dooling, 2009). Dooling (2009) coins the term eco-gentrification in her discussion of Seattle's displacement of its homeless population through development of its public green spaces. Eco-gentrification is noted as the "contradictions that emerge between economic rationality and its associated environmental ethics, and the production of injustices for politically and economically vulnerable people" (Dooling, 2009: 630).

There have even been arguments for making urban development "just green enough" (Wolch, Byrne, Newell, 2014). Because green spaces are not always equally distributed and access becomes stratified across socioeconomic lines, academics advise policy makers to shape their projects according to community needs and desires. Collaboration with the key stakeholders – that is, residents of the community – can measure the extent of eco-gentrification.

The chain of events in eco-gentrification begins when a city sets aside land to be developed according to ecological values. The city may seek to reduce its environmental footprint or implement climate adaptive strategies. It may want to boost tourism and create a *liveable* environment by making a space green and attractive. As the price of surrounding land increases due to the new natural amenity, it becomes unaffordable for lower income populations. This results in increasing segregation across the community and higher economic disparity (Wolch, Byrne, Newell, 2014; Dooling, 2009). In Dooling's case study, homeless populations, pushed into their situation by a lack of affordable housing, are restricted from occupying the public parks that have been developed in lieu of affordable housing. In this way, the discourse and policy making of sustainable development diminishes the standing of certain individuals within the community.

While Dooling's definition relies on the ecological aspects of development in the city (i.e. the restoration of the nature in the urban areas and its effects on users of the public space), other authors have changed the term to one about environmental gentrification (Checkers, 2011). In this context, the discourse centres around the impact of economic growth-centred development of parks in Harlem. The strategy of park expansion in Harlem as a means of real estate development is discussed in its impact on equity in the neighbourhood. It relates to the previous discussion of livability and equity as park expansion can create a more liveable physical space but can lead to inequity.

Another example of eco-gentrification used from New York City is the High Line, a park in Manhattan built on a disused section of the New York Central Railroad. Darren (2011) defines the High Line as not just a park, but a re-branding effort on the part of the city that has inadvertently led to inequality. The author credits the neo-liberalist urban governance in the city for creating the disparity brought on by the project. The High Line was an effort on the part of the city to create an appealing, liveable urban space. It boosted the number of visitors in the area through its visual appeal and greenery, but may have prompted inequity in the city as well.

Portland, Oregon is also noted as a place of eco-gentrification in Goodling, Green, and McClintock's (2015) article. The authors' study describes how green investment in the city led to visible inequity as displayed in the 82nd Avenue which became a boundary between the white and affluent and diverse and poor. "Greening" efforts have included redevelopment of brownfields, a focus on sustainable transportation, and growth of farmers' markets. Termed the "urban sustainability fix" by While *et al.* (2004), these green development projects favour sustainability branding to bring in growth and attract affluent, well-educated residents – at the expense of equity. The existing historic structural inequity already in Portland is thus exacerbated as benefits of greening projects are unequally dispersed.

Bunce (2009) studies the West Don Lands in Toronto, once an industrial waterfront that underwent sustainability-focused redevelopment by the Toronto Waterfront Revitalization Corporation (TWRC). TWRC's definition of sustainability has translated into urban intensification, with LEED-certified residential and commercial communities to be constructed by private sector developers. Other sustainability policy is written into contracts for sale of land to private hands. This transfer of public lands to private developers, with the goal of achieving a return on investment of 14%, is presented as "policy-led gentrification" (Bunce, 2009: 653-654).

These studies show that gentrification as a result of sustainability-focused programs is a concern within the environmental justice scholarship. While the gentrification conflict is described in the Prism as the tension between equity and livability, *eco-gentrification* brings in interactions from the ecology and economy aspects as well. The studies described above demonstrate how cities use the ecology aspect – either through environmental sustainability programs or built green amenities – to revitalize urban areas. These strategies have additional unintended consequences for the economy, equity, and livability in the city. Eco-gentrification, a notable component of the environmental justice literature, can be further broken down by studying it through the Sustainability Prism's aspects. This thesis adds a new way of studying environmental justice and eco-gentrification issues by using the lens of the Sustainability Prism.

The above examples of eco-gentrification are a non-exhaustive summary of the existing literature; however, they give a sense of the locations that have been studied in the environmental justice literature. This thesis adds to the literature of the "urban sustainability fix" by adding knowledge using a new context – the study of a city that has used environmental sustainability to market itself located in what has traditionally been perceived as a welfare state.

2.5 Use of theoretical framework

The Sustainability Prism is used in this thesis to assess environmental justice in the case city, industrial Malmö and post-industrial Malmö. By breaking down environmental justice into the aspects of the Sustainability Prism, the concept becomes more manageable to understand as

the relationships between the various aspects come to the forefront. The study of the relationships between the four aspects of the Prism reveals which are given more weight in policy making and how they interact with each other. The four aspects, as used in this thesis, can be described as follows:

- **Economy:** Factors that promote economic growth
- **Ecology:** Factors that promote preservation of the natural environment, environmental solutions, and reduction of environmental impact
- **Equity:** Factors that promote socioeconomic equality
- **Livability:** Factors that promote a productive relationship between people and the physical environment

This thesis investigates the relationships and trade-offs between these four aspects. Industrial Malmö is analysed through the Prism's aspects to gain a sense of which aspects were given the most weight in the past and to give context for the city's present state. Malmö's current city agenda and housing developments are studied through the Prism as well. The potential presence of eco-gentrification is studied in present-day Malmö by assessing implementation and communication of green amenities. As mentioned in section 1.2, sustainability measures in municipal housing are used as a proxy for green amenities. Understanding which sustainability measures are implemented, how they are communicated, and whether it is equitable across socioeconomic areas in the city can help us understand whether eco-gentrification exists today.

2.5.1 Study of green amenities

The impact of green amenities is studied to understand the potential for eco-gentrification in Malmö today. This is related to the broader discussion of eco-gentrification in a neo-liberalising city that uses environmental sustainability as a marketing tool. Studying eco-gentrification is important to understanding a more recent current of environmental justice issues – the inequities caused by the implementation and marketing of urban regeneration programs focused on environmental sustainability.

Whether green amenities have the potential to impact environmental justice is studied through communication and implementation of sustainability measures in municipal housing sites. As described in Chapter 1, this question is broken down into several sub-questions.

Sustainability measures in municipal housing projects impact all four aspects of the Sustainability Prism though the impact is more significant for certain aspects. These are described below:

- Are sustainability measures in housing in Malmö equitably implemented and communicated across socioeconomic areas?

This question is used to study the **equity** aspect of the Sustainability Prism. Inequitable implementation and communication has implications for polarization and neighbourhood inequality. Equity in implementation of sustainability measures in municipal housing in

Malmö is important to study because variation in implementation determines who has access to environmental impact reducing tools. Further, how and where green amenities are placed demonstrates whether urban managers understand the diversity in Malmö and accommodate these differences. It is important to note that if no difference in implementation could be found, this has its own set of implications for environmental justice including the potential for gentrification as premium rent prices are demanded for better equipped housing and lower income populations are displaced.

Differences in communication could be a result of inattention to certain segments of the population or a purposeful catering to varying demands and needs of population segments. Further implications could be that this communication appeals to certain segments of the population. For example, advertising sustainability standards in poor neighbourhoods could be considered a premium and appeal to wealthier residents. On the other hand, sustainability standards in housing could be absent from advertising in poorer areas, affirming that the city does not think it necessary to include for some socioeconomic groups. The literature review in the previous section showed the importance of communication – the example of the Eco-density program in Vancouver (Rosol, 2013) showed how a densifying urban program was sold as an “eco” program to residents.

The purpose of the difference is also important to study because it could explain whether the root of the disparity is in unintentional inattention or purposeful inattention, both of which have different consequences for the current and future residents of the neighbourhood.

- Which sustainability measures are being implemented?

Ecology is impacted by the type of sustainability measures. The measures investigated in this thesis impact energy consumption, carbon emissions, and climate adaptation. Together they reduce the environmental footprint of residents.

Sustainability measures also affect **livability** as they are built into the physical space that residents occupy. They are the integrated physical measures that impact the environment that people live in and are tools for residents to reduce their own environmental impact (e.g. car pool or bike pool).

- How are sustainability measures communicated? / What is the target audience? Are sustainability measures being used as a selling tool?

How green amenities are communicated is important to study because it can reveal the target audience. This, in turn, indicates how urban managers cater to different residents. Sustainability measures directly impact **economy** as they may imply an additional premium on rent. This may make housing more unaffordable, attracting a wealthier subpopulation that is able to pay more expensive rent. This can change the socioeconomic composition of neighbourhoods and provoke further socioeconomic segregation. Communication and marketing of housing projects can reveal the intended audience for the housing; the way sustainability measures are presented can also indicate whether they are being used as a marketing tool.

3 Malmö as a case study

In this chapter, I present the case of the city of Malmö in the Southeast region of Sweden. Once a place that depended on industrial means for growth, the city has undergone a transformation into a clean, knowledge-focused centre that is attractive for businesses to invest in and people to live in. Part of Malmö's strategy has been to market itself as an environmentally sustainable city. This chapter follows Malmö's trajectory, providing historical context and background on its housing market, in order to be able to analyse later through the Sustainability Prism in Chapter 5.

3.1 Malmö transition to an entrepreneurial, knowledge city

Malmö is located in south-eastern Sweden in what is termed as the Øresund region due to the Øresund strait which runs between Denmark and Sweden (depicted in Figure 3-1 below).

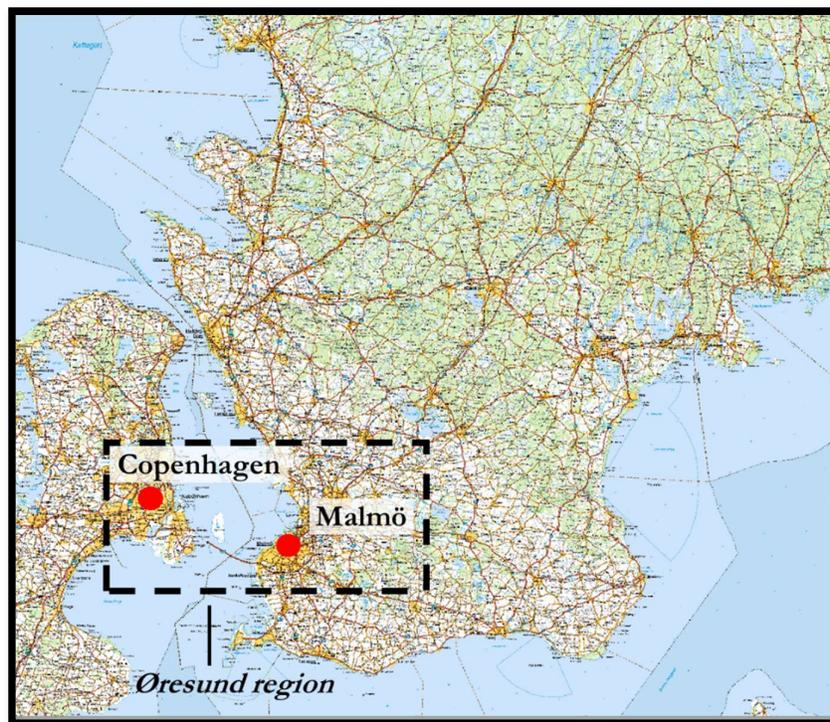


Figure 3-1 Map of Øresund region

Source: Map by author. Layers provided by © Lantmäteriet (2015)

Malmö's industrial story begins in the 16th century when it became a centre of trade and commerce. Throughout the 19th and early 20th centuries it grew into a major ship-building centre through the operation of Kockums shipyard; the city's economy came to be dominated by the shipping industry, as well as the leather, textiles, and food processing industries (Starke and Sheehan, 2007). In the 1970's and 1980's, the city experienced the effects of the 1970's economic crisis and continued recession (Rodenstedt, 2014). The closure of the Kockums shipyard and Saab plant in the mid-1980's led 35,000 people to leave the city; high rates of unemployment continued into the 1990's. Policy makers in Malmö were forced to reinvent their vision for the city and set a path to transform Malmö into a post-industrial city focused

on new types of industry and urban regeneration (Hall, 2013; Dannestam, 2009; Starke and Sheehan, 2007).

Post-industrial Malmö became an “antipode” to its previous state focused on branding itself as attractive to investment and new, wealthier residents. Whereas the city had once been an emblem of welfare in Sweden, attracting and providing for large numbers of immigrants, it now had to balance growth *and* being a welfare provider. This does not automatically mean that previous welfare measures disappeared, but new policies of strengthening the brand of the city did not always translate into policies benefiting everyone (Dannestam, 2009).

Scholars sometimes term Malmö as a *knowledge* city or an *entrepreneurial city*. These phrases denote a place where the economy is based in attracting talented people and organizations with an innovative capacity; essentially, economic growth becomes reliant on human capital. In Malmö, this transition has been driven by the city’s desire to bring in more investment and business (Madureira, 2014). The area’s many entrepreneurial-focused programs, including the region’s start-up incubator, Innovation Skåne, support this narrative. Malmö is considered to be one of the most inventive cities in the world and has been noted as an emerging tech hub (Business Sweden, 2015). In terms of investment, Malmö trailed only Stockholm and Copenhagen among cities in the Nordic countries in number of investments during 2016. Start-ups are attracted to the opportunities in the Skåne region and the amount of capital has increased three times from 2014 to 2016 (Carlström, 2017).

Malmö’s transformation into an entrepreneurial city has not solved continued social issues, including crime and segregation in the city. Sometimes described as the “Chicago of Sweden,” Malmö has been highlighted in the news for its relatively high crime rates. Described as “multicultural,” immigration in the city is seen as one of the driving factors in the polarisation and violence in the city. Neighbourhoods like Rosengård, known for their large foreign-born populations, are places of lower income. Panican *et al.*’s (2013) work on poverty in Malmö shows that policy makers in the city are reluctant to discuss and include poverty in their governance. The issue of relative poverty within the city is not discussed explicitly and it is often shadowed by discussions of the social welfare system. This discourse occurs simultaneously to the one presenting Malmö as a knowledge city (Rodenstedt, 2014).

The Commission for a Socially Sustainable Malmö has identified a number of inequities that exist across the city in health, education, and income. The document highlights the high child poverty Malmö exhibits compared to the rest of Sweden and the variation in health within Malmö. “There are large differences between different city districts when it comes to access to green spaces, inviting outdoor environments, trust and well-being, and problems with overcrowding, homelessness and housing supply,” states the Commission (Commission for a Socially Sustainable Malmö, 2013: 67).

According to Dannestam (2009), an entrepreneurial city may tout economic competitiveness over redistribution policies. This style of governance is a derivative of the neo-liberalism increasingly seen in city policy-making. Neo-liberalism in governance means the market plays a more significant role in deciding how wealth is distributed across the city. If the transition to a knowledge city can spur innovation and greater investment in the area, the “trickle down” effect is expected to bring wealth to those in need without extensive aid from the state (Zinkernagel, 2017). However, this may not always be the case as the city of Malmö has experienced continued polarization.

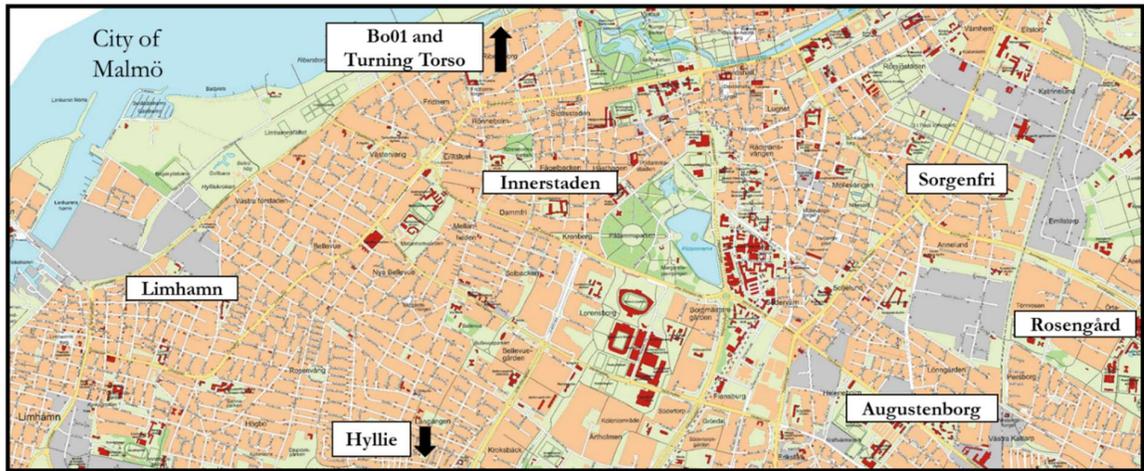


Figure 3-2 Map of Malmö

Source: Map by author. Layers provided by © Lantmäteriet (2015)

The neighbourhood of Rosengård, seen in the eastern part of the city in Figure 3-2, often comes up when conversation begins about polarization in the city. Rosengård was the recipient of much of the Miljonprogrammet housing (to be described in section 4.3). After deindustrialization and migration to the suburbs, the area began to see a socio-economic decline. High percentages of foreign-born residents, high levels of unemployment, and low-income levels demonstrate the social challenges the neighbourhood has faced. The area was even exhibited in international media as a problem area in Sweden (Parker and Madureira, 2016; Madureira, 2014).

The area of Sorgenfri, central to this research, contains two of the housing projects discussed in this thesis. Sorgenfri is Malmö's oldest industrial area and was historically occupied by manufacturing and, more recently, the pharmaceutical industry. In 2008, the municipality decided to increase the attractiveness of the neighbourhood with a plan that would bring in investors, residents, companies, and visitors (Madureira, 2014; Malmö stad, 2008).

Limhamn is located to the southwest of the Western Harbour area that has been redeveloped into Bo01. Throughout the 19th and 20th centuries, it was the site of the one of the largest limestone quarries, as well as cement manufacturing. In the present-day, Limhamn is one of the wealthiest areas in Malmö, often compared to neighbourhoods like Rosengård to highlight the difference (Sandberg, 2014). It is the location of residential and retail premises and is in close proximity to the sea (Malmö stad, n.d.). The Limhamn area, and specifically the Kalkbrottet quarry, has been written about in its relation to environmental gentrification as the quarry has been replaced by housing developments that target upper-middle and high-income residents (Sandberg, 2014).

3.2 Sustainability branding in a neo-liberal agenda

Malmö's use of sustainability to brand itself is a direct response to its industrial history. Cleaning up and greening the urban area became important as the city moved away from its

reliance on its shipping economy; sustainability has now become a central selling point for Malmö (Jamison, 2008; Mukhtar-Landgren, 2008).

The Bo01 development established in Western Harbour for the 2001 European Housing Expo, Bo01, is a classic example of Malmö's success in presenting itself as a centre for innovative sustainability ideas. The neighbourhood has transformed the once industrial harbour area into a carbon-neutral neighbourhood powered by renewable energy (Madureira, 2014). In addition to a permanent housing area, the exhibition site also had an area for demonstration housing. The project was used to showcase Malmö as the "City of Tomorrow" in the international arena. Bo01 focused on environmental issues such as energy consumption, mobility, soil decontamination and reclamation, and waste management and was built to sustain itself on renewable energy (Fossum, 2008; EGBF, 2001). A few years later, the Turning Torso opened up in the same area. The Turning Torso, noted as one of the highest residential towers and for its unique shape, has become one of Malmö's key symbols as it can be seen as the train crosses the Øresund Bridge. The old landmark, the Kockums shipyard crane, was dismantled (Madureira, 2014; Baeten, 2012;).

The development in Hyllie, constructed between 2007 and 2013, echoed the sustainability ambitions of Bo01 but was also built with the goal of attracting new residents and investment to the area. Located a mere twelve minutes from Copenhagen, housing projects in Hyllie were built as an attractive option for residents of Denmark looking for lower housing prices before housing prices dropped in Denmark (Baeten, 2012). This ambition, to build a greater network in the Øresund Region between Copenhagen and Malmö, thereby stimulating business and flow of culture, is described in Malmö's 2014 plan for the city (Malmö stad, 2014). A consequence of this focus is that some projects in Malmö have not fully addressed segregation and income disparity within the city, continuing to push the neo-liberal agenda forward. For example, the Urban Development Project in Hyllie in Malmö exhibited the closed-off tendencies of earlier projects as social matters were absent from discussion during development (Baeten, 2012). Instead, social issues are to be addressed through a neo-liberal trickling down of ideas, environmental measures, and wealth (Pearsall & Anguelovski, 2016; Mukhtar-Landgren, 2008). In this way, Hyllie could perhaps begin to raise the status of poorer areas in the city.

These developments have the potential to further segregate the city, pushing affluent, educated residents into the city and ignoring the current social and environmental problems. Scholars in urban studies describe how the "brand" of the city has become central to governance, lessening the stress on redistribution strategies. The claim is that this transformation has been guided strongly by market principles and competition for investment and innovation rather than a desire to accommodate those with lower incomes; neo-liberalism in Malmö has become the new guiding strategy, giving more power to the markets where the state was once king (Madureira, 2014; Baeten, 2012).

Augustenborg Eco-city is another project that various actors in Malmö, including the city government, MKB, and a number of NGOs, have used to position the city as environmentally sustainable. Begun in 1998, the project aimed to redevelop and improve the Augustenborg residential area in Malmö which had fallen to a variety of socioeconomic and environmental problems. The project solved for environmental problems around storm water management and energy conservation and encouraged community participation. It also pushed forward a myriad of mobility options and helped advance use of green roofs. Ultimately, it provided a way to rehabilitate the neighbourhood and reduce emigration from the community (SGRI,

2017; VA SYD, 2008). MKB's housing project, Greenhouse, is the most recent construction brought to Augustenborg and is equally environmentally forward; this project is described later in this thesis.

A more recent initiative to build sustainably was introduced in the Miljöbyggprogram Syd (Environmental Building Program South). This initiative began in 2009 and lasted through 2015. It allowed the city of Malmö to set environmental standards in contracts for public land that was sold to private actors. Environmental achievements were classified according to three levels (A, B, C). The core areas addressed by the program were energy, indoor environment and moisture safety, urban biodiversity, building acoustics, and traffic noise (Miljöbyggprogram Syd, 2017).

The city of Malmö has used its cutting-edge sustainability policies to attract investment and a wealthy creative class. Incoming organizations and affluent populations reinforce Malmö's place as a desirable city to live in and invest in. Further, companies like E.ON and private developers that build in Malmö use their projects in the city as part of their portfolio. The developers in charge of Augustenborg Eco-city and Western Harbour add these projects to their portfolio as they sell their services in other quickly urbanizing countries like China and India (Baeten, 2017, personal interview).

The feedback between private companies and developers continues to feed itself as the city builds away its past. Baeten (Baeten, 2017; Baeten, 2012) describes the new developments as a nuanced continuation of the city's Social Democrat tradition in that the city has chosen to build as a way to solve for deprivation and economic disparity within the city. Unfortunately, the benefits of new projects along the Øresund line – the Turning Torso and Hyllie development project, to name two examples – do not spread into other adjoining neighbourhoods in Malmö. Some areas close to Hyllie that can be described as relatively deprived have not encountered the same zeal for development as in the Hyllie area.

3.3 The rental housing market in Sweden and Malmö

The present day rental market in Sweden is marked by a shortage of housing. In 2016, 94% of Sweden's population lived in a municipality with a housing shortage. In the period 2014-2015, the greater Malmö area had 7.8 dwellings in construction per 1000 inhabitants, higher than the national average of 6.5 and greater Gothenburg's (6.7), but lower than the greater Stockholm area (9.7) (Hurvibor, 2017b: 13). The Malmö Commission depicts the housing shortage in its policy document – in 2010, the demand for housing need was 2500 apartments, but only 500 dwellings were completed in that year (Commission for a Socially Sustainable Malmö, 2013). The problem has received recognition in Malmö – in 2016, the city of Malmö reached record number for construction of new dwellings with 3,100 new dwellings (Hurvibor, 2017b: 30).

Municipal housing companies came into existence in the 1930s when housing shortages led to more state involvement - MKB started in 1946. The Swedish term the period between the 1930s and the 1960s "Folkhemmet." Translated as "People's Home", the Folkhemmet philosophy came into being in 1928 by the Social Democrat leader Per Albin Hansson with the intention of creating a middle way between Swedish nationalism and socialist modernism (Wittrock, 2011). It also included the belief that residents should be provided "security, equality, and good housing standards" (Rosenstedt, 2014: 65).

Scholarship on the housing market in Malmö and Sweden often begins during this time with the Miljonprogrammet. This often-mentioned program provided about a million new homes for Sweden's residents between 1965 and 1974. Strongly state-subsidized, 9 in 10 new dwellings were financed by municipal housing companies during this time. The goal of the project was to provide affordable housing for residents of Sweden's cities and ended up attracting large amounts of lower income foreign-born residents and leading to segregation within the city (Baeten, Westin, Pull, Molina, 2017; Baeten & Listerborn, 2015; Andersson & Molina, 2003). One of the recipients of the Miljonprogrammet was the neighbourhood of Rosengård which has since become featured in the news as a place of crime.

In the 1990's, the state's role in the housing market weakened as housing subsidies were abandoned, rents increased, and taxation of rental properties also became higher (Baeten & Listerborn, 2015). The Swedish housing market began to change in the early 2000s when private actors in the housing sector raised concerns that Sweden was not complying with the European Commission's demands for open competition. The response in Sweden was to withdraw subsidies to public housing in order to maintain the universal system of housing with no special conditions to make tenants eligible for public housing (Grander, 2017). In 2011, national legislation mandated that housing companies begin acting in a "business-like manner" in accordance with EU regulations, pushing housing development to be more focused on profit and growth (Grander, 2017). Baeten and Listerborn (2015) note a "hollowing out of principles" during this time as the market came to the forefront in guiding decision-making.

The transition of municipal housing companies, like MKB, into profit-earning companies came with the stipulation that all actions had to be economically justified and that social responsibility would continue to be part of the mission of municipal housing companies. Grander's (2017) study of municipal housing companies revealed that the companies' social responsibility lies in three main areas: a good tenant-landlord relationship, CSR area-based projects like school improvement, and the increase of an affordable housing supply for the public.

The challenge in the marketization of municipal housing companies is maintaining socially inclusive policies (Grander, 2017). Grander (2017) relates the study of welfare regimes to housing. Sweden's social democratic welfare system has historically been characterized by universal benefits and a message that housing is for everyone, not handed out in a means-tested way. However, Baeten & Listerborn (2015) suggest that the idea of affordable housing in the city has transformed from a solution to a problem as affordable housing does not attract the affluent creative class. In this way, the city's neo-liberal mood may be attaching a stigma to affordable housing that was once considered a basic need for everyone. Christophers (2013) describes the current housing market as a hybrid between centralized policy and market-driven development. Meanwhile, the amount of affordable rental housing continues to diminish. Urban studies scholars attribute it to a combination of public land being transferred to private developers who sell with a premium, as well as tenant-led initiatives to form cooperative like schemes in their buildings (Baeten, 2017, personal interview).

One strategy that municipal housing companies employ to improve social sustainability in the city is creation of a mixed housing environment. To decrease segregation, housing projects try to attract new groups of people to less attractive areas. Large-scale projects like Hyllie and the planned Culture Casbah promise dining and attractions near the housing (Grander, 2015). This is in line with the city's aim to build mixed-function, dense city.

Rents in Sweden are creeping up despite limitations set by the Tenants Union. As expected, the rents are dependent on the type of housing and location. Rent in Miljonprogrammet housing is typically lower, especially if renovations have not been implemented (Hurvibor, 2017a). Rent in rental apartments is set through negotiations between the landlord and the Swedish Union of Tenants. The rent is determined by a number of factors including the size of the apartment, the age of the building, and the “attractiveness” of the neighbourhood. New constructions and larger apartments mean a higher price but final rent will still be within the boundaries of what is reasonable for the neighbourhood. Such a system prevents escalating rents and maintains affordability in neighbourhoods (Hyresgästföreningen, 2017, personal interview). Despite the negotiation-based rental system, housing price creep still exists (Hurvibor, 2017a).

Renovation of existing housing contributes to some of the rent price increase. Baeten *et al.* (2017) study the displacement of residents in Stockholm in renovated Miljonprogrammet apartments. Symptoms of eco-gentrification can be seen through in “soft tactics” such as renovation which lead to residents moving out as they increase rent prices and make the housing unaffordable for tenants. One of the soft tactics mentioned is CO₂ reduction measures. Interviews conducted by the authors demonstrate that developers in charge of renovations are profit-driven, explicitly mentioning that their strategies sharpen inequalities.

3.4 MKB's role in Malmö's housing market

This thesis focuses on residential buildings built by Malmö's municipal housing company, MKB. MKB is chosen as the point of study because it is reflective of the city's increasing reliance on the market. Once owned by the city, the municipal housing company is now run in a more business-like manner with an increased emphasis on generating revenue. Thus, we can use MKB to view Malmö's transition from a city focused on welfare to one more guided by global market.

While social-focused goals such as addressing the housing shortage and providing affordable living solutions remain a focus for MKB, the company's financial growth remains equally important; MKB has been profit making since the national mandate came into effect in 2011. MKB's Board of Directors is politically appointed and has the responsibility of appointing the CEO of MKB. The CEO appoints the management team.

Studying MKB as facilitator of the city's urban planning strategy is reasonable given the close relationship between MKB and the municipality. MKB's position as a municipal housing company and its influence on livability, economic growth, and the environmental footprint in the city demonstrates its power as an “urban manager.” An urban manager can be described as influential in setting the path for the city – something MKB does through new developments and its close ties with the municipality.

MKB's ownership of one third of the rental market in Malmö is revealing of its influence in the municipality. Given the housing shortage in all of Sweden and in Malmö, MKB has set a goal for itself of building 750 new rental apartments every year (Holmquist, 2017, personal interview; MKB, 2016). The municipal housing company hopes to meet this goal while maintaining profitability, building in a cost-effective way, and maintaining strict sustainability measures in all new construction.

The research focus of this thesis becomes particularly poignant as MKB accelerates its construction to meet the housing shortage. While building quickly and in large amounts, can MKB maintain its triple focus of profitability, social sustainability, and environmental sustainability? Understanding whether the sustainability measures are equitable across new constructions in different districts of Malmö will indicate the attention that MKB is giving to sustainability across the city.

The next two subsections describe three projects across two neighbourhoods that have been built with the help of the city of Malmö, MKB, and other partnering actors. The projects illustrate how urban managers in Malmö are attempting to tackle environmental issues, increase the city's attractiveness to investment, while also addressing social challenges.

3.4.1.1 Eco-city Augustenborg and Greenhouse

Housing in Augustenborg was first constructed between 1948 and 1952 as some of the first post-war housing. The neighbourhood began revitalization efforts in 1998 due to the socioeconomic stress in the 1990's which caused many residents of the area to move out to other parts of the city (SGRI, 2017; Hambleton, 2015). The renovation, a project between the City of Malmö, MKB, and NGOs, included improvements in energy and instalment of climate adaption mechanisms like green roofs. The green roofs, in particular, were significant in reducing the frequent flooding that had been affecting housing in the area. A roof garden opened in 2001 that increased biodiversity in Augustenborg by 50%; it has been used to promote the use of green roofs across the Nordic countries (DAC & Cities, n.d.).

A number of other environmental solutions were implemented in the development. Energy efficiency was improved by 20% compared to 1995 levels with the aid of solar energy and wind power. Mobility options were expanded through a carpool system of low-carbon vehicles and more bicycle transportation. These mobility options have helped reduce the parking density in the Greenhouse from 0.8 parking spaces per apartment to 0.4 (Ecodistricts, 2013).

The revitalization efforts also included a social sustainability component as the urban managers in this case engaged with the district's residents, asking for their participation in community discourses. This prompted increased pride in the community leading to a reduction of 20% in emigration from the community (Ecodistricts, 2013).

MKB's 11-story high-rise called Greenhouse is the newest addition to the area. Completed in 2016, it is marketed as "smart, simple, green, and sustainable" and integrates many environmental solutions. These include recycling and sorting houses, car pool and bicycle pool, and individual energy metering even in laundry rooms and associated monitoring tools. The house is also certified according to the Environmental Building Programme South energy requirements and meets the Passive House Standard - it consumes solely renewable electricity and electricity consumption does not exceed 50 kWh per sq m (MKB, 2015).

3.4.1.2 Culture Casbah

Culture Casbah is project that has been in the planning stage for quite some time and is emblematic of the city's efforts to revitalize and change neighbourhood culture. It was brought up frequently in interviews as a contentious new project in the city of Malmö. It serves as a comparison point for the projects that are investigated later in the analysis. It is one of MKB's "experimental" projects and is a collaboration between MKB and private companies.

The Culture Casbah will be located in Rosengård, a neighbourhood often noted as having social and economic problems. The project's goal is to "lift the neighbourhood" (Kindt, 2017, personal interview; Grander, 2017; Zinkernagel, 2017, personal interview), echoing the neo-liberal sentiment of using economic investment to effect social change. The Culture Casbah is a collaborative project between MKB and three other private real estate companies (Jonborn, 2017, personal interview). Given its unique architecture and aim of revitalizing a deprived neighbourhood, the project has escalated in publicity.

Computer visualizations of Rosengård showcase it as a building in a verdant neighbourhood. Trees sprout from the layered roofs of the building, emphasizing the structure's environmental friendliness. The description on the website of Culture Casbah describes it as an urban development meant to make Rosengård safe, desirable, and essential to Malmö.

The Culture Casbah even has its own website that emphasizes the building's proximity to Malmö centre and to Copenhagen. In addition to a section on the website titled "A visit to Copenhagen for cultural influence", the aim of the building is clearly seen in the many referrals to Malmö's business opportunities and calls to invest in the Skåne region. A page about Malmö links to Malmöbusiness.com and investinskane.com with little actual description of the urban area. The use of the new building as a tool to appeal to investment is clear in its marketing.

There has been some controversy over the new structure and its aim. An article by eighteen researchers in the social sciences and urban studies details their concern for the proposed residential and office tower. Their concerns revolve around the diminishing stock of public housing as MKB partners with three private real estate companies to sell apartments. While the goal of the Culture Casbah is to equalize the living conditions across neighbourhoods, there are fears that the project will raise property values in the neighbourhood leading those who currently live in the neighbourhood to move out (Baeten *et al.*, 2016).

4 Research Methodology

This chapter describes the methodology used to explore environmental justice and, more specifically, the implications of green amenities. The city of Malmö was chosen as the setting for this investigation. As described in Chapter 3, post-industrial Malmö has rebranded itself as a hub for environmental sustainability to attract different knowledge-based industries and the creative class. This type of environmental marketing can lead to environmental justice issues such as eco-gentrification (described in greater detail in 2.4). Malmö is an interesting case study due to its location in the Scandinavian region and Sweden's dual nature as welfare provider and growth generator. Assessing the city in light of its location and welfare system contributes new information to the existing environmental justice literature.

New housing projects by Malmö's municipal housing company, MKB, were chosen to study the consequences of green amenities. MKB was chosen due to its close ties with the city as described in 3.4. The relationship between MKB and the city makes it highly likely that the city's agenda is filtered through the municipal housing company. This also means that the municipal housing company is reflective of the city's transition from a welfare-focused policy-maker to one that is guided by the global market. This thesis posits that one may see a change in MKB's housing as well. Augustenborg Eco-city and Greenhouse are two of MKB's projects that exhibit the selling of environmental sustainability as city marketing. In this thesis, typical rental housing is studied – not MKB's R&D projects like Eco-city and Greenhouse with innovative environmental solutions – to assess whether green amenities in these housing projects have the potential to affect environmental justice in the city.

4.1 Assessing environmental sustainability past and present

The first RQ posed in Chapter 1 – *What has been the impact on environmental justice – as seen through the lens of Malmö's residential developments – as Malmö has transitioned from an industrial city to a knowledge city?* – was answered by assessing industrial Malmö and post-industrial Malmö through the Sustainability Prism Model. The Sustainability Prism was applied to the city description and historical context described in Chapter 3. As described in Chapter 2, the Prism is useful in breaking down the concept of environmental justice in the city. Understanding the interplay of the aspects in the past and present gives a more holistic background for understanding environmental justice. We gain a richer picture of environmental justice in present-day Malmö by understanding the relationship between the Sustainability Prism's aspects before Malmö's sustainability branding agenda. This analysis also provided insight into the advantages and limitations of using the Sustainability Prism as a tool to assess environmental justice issues.

4.2 Analysis of green amenities

The next section digs into the environmental justice issues and potential eco-gentrification issues posed by RQ2. These questions are investigated by studying the communication and implementation of green amenities – in this case sustainability measures in municipal housing projects – in Malmö. The choice of housing project sites is described in section 4.3.

4.2.1 Analysis of implementation

Implementation of green amenities has an impact on the ecology and livability aspects as discussed in section 2.5. If implementation is uneven, environmental equity in the city becomes a concern.

Three sustainability measures were studied as proxies for green amenities: energy consumption of the housing project, mobility options, and presence of green roofs. These three measures were chosen because they represent the sustainability areas that MKB is focusing on, relate to the targets in the city’s environmental plan, and are the most applicable tools for residents in reducing their environmental footprint. Their relation to the aspects of the Sustainability Prism and to the resident and neighbourhood is described in Table 4-1.

Table 4-1 Implications of sustainability measures on components of Sustainability Prism at neighbourhood level and resident level

Implications of sustainability measures on:	Neighbourhood level	Resident level
Ecology	City sustainability targets are met by neighbourhoods working to reduce energy use and carbon emissions; green roofs provide climate adaptation measures	Resident is able to lower personal environmental footprint by taking advantage of environmentally friendly mobility options, energy efficiency standards
Economy	New environmentally-friendly constructions can raise a neighbourhood’s image, drawing in investment to the neighbourhood	More affordable rents for residents because costs of operating residential complex are decreased
Equity	Greening measures improve environmental image and standards of a neighbourhood and can raise the attractiveness of a neighbourhood; may mean higher rent prices in the neighbourhood; can entrench inequality across neighbourhoods if measures not equally distributed	Residents across socioeconomic gradients are given access to greening measures if measures are equally distributed across the city; otherwise, can lead to unequal coverage – implications for environmental justice
Livability	Neighbourhood environment is improved through better movement, visual appeal of green roofs and park areas, and energy-friendly built environment	The resident’s day-to-day life is facilitated by more mobility options and energy standards mean lower energy costs; building is more visually appealing with green roof

Because energy, mobility, and green roofs are important to MKB and the city as environmental measures, data for these aspects was relatively easy to collect. Project leaders at MKB are aware of these statistics and are able to provide the quantitative measures. Other data, such as waste collection, may be available on an annual basis or may be totalled for all projects, making discerning differences more difficult.

These aspects are also related to Malmö’s goals for the city. For example, energy efficiency helps the city reduce its energy consumption, while mobility options like bike and car pools facilitate reduced emissions and changing residents’ travel behaviour. Green roofs are visually appealing but also useful for adapting buildings to increased rainfall. In this way, the measures are a way to understand the ecology aspect in Malmö’s residential developments.

Energy efficiency standards and mobility options are tools that residents have to reduce their own environmental footprint. By being aware of their energy consumption and having access to environmentally-friendly transportation options like car pools and bike pools, residents can curb their emissions and consumption of resources. In this case, energy efficiency standards also signal MKB's efforts to cut down on energy consumption. Innovative energy efficiency and mobility solutions can signal to business and new residents that a neighbourhood is undergoing revitalization efforts and become more liveable – it becomes a more attractive place to live and work in and higher rents may follow.

Green roofs are much less a tool for residents than they are a climate adaptation device integrated into the housing. However, they have the distinct characteristic of being visible to residents and passing pedestrians and drivers, ameliorating the appearance of buildings and showing off the sustainability aspects of the project. Much like green amenities like parks, they improve the appearance of residential housing and have the potential of increasing appeal, making a neighbourhood more attractive, leading to a transformation in the character of the area.

The implementation of these factors in housing projects in Malmö can fulfil sustainability goals. However, unequal distribution of these measures can better some neighbourhoods and not others. Unequal implementation can result in inequities in the types of tools residents have to reduce their environmental footprint. These implications have been described in more detail in section 2.5.

These sustainability measures are evaluated according to benchmarks described below. These benchmarks include other developments in Malmö and national legislation. Then, a comparative analysis of sustainability measure in MKB's housing projects is conducted using data gathered from MKB's project leaders according to the below specified indicators. Additional information for comparison was collected from descriptions of other developments

The measures for energy efficiency, mobility, and green spaces are described here, along with relevant legislation and standards for comparison. As discussed previously, integration of these measures into MKB's housing projects has implications for the ecology and livability aspects due to their ability to cut down on the environmental footprint and create an environmentally beneficial interaction between residents and their physical environment.

- **Energy efficiency:** Energy efficiency standards for different types of buildings are set by Boverket, the National Board of Housing, Building, and Planning. The regulation from the National Board of Housing, Building, and Planning for an area like Malmö (a zone IV area) is 75 kWh per sq meter annually for a multi-dwelling block. This baseline is taken as the comparison point to understand how energy efficient MKB's policies are.

Two other accreditations that may be used in certifying energy efficiency – and which were achieved by the Greenhouse in Malmö – are the NCC's Passive House standard and the NCC's Miljöbyggnad standard (NCC is one of Scandinavia's largest construction companies). The Passive House standard relies on extra insulation measures and heat recovery to reduce the energy used by 50%. The NCC notes that achieving this type of standard means higher investment in the construction phase but long-term operating costs are reduced (NCC, n.d.).

The Miljöbyggnad standard is broken up into four classifications (Gold, Silver, Bronze, and Rated) and assesses a building's energy use, indoor environment, materials and chemicals (NCC, n.d.).

Energy efficiency in the chosen housing sites is compared to the nationally regulated requirement and to ambitious housing projects like Greenhouse described in Chapter 3.

- **Mobility options:** According to regulations in Malmö municipality, 0.7 parking spaces are required per apartment. In contrast, the current demand for parking is measured at 0.8 parking spaces per apartment. Municipalities can supplement lower parking to person ratios with other means such as car pools and bike pools (Andersson, Thörn, Gomér, Mandell, 2015). Whether or not these other mobility measures focused on pooled transportation are present indicates the effort that MKB is putting into making the mobility element in its housing more sustainable. The ratio of parking spaces to apartment is analysed as well as the presence of other mobility options like car pools and bike pools.
- **Green roofs:** The presence of green roofs has been growing in MKB's projects since the Augustenborg Eco-city project. Green roofs influence into the Green Space Factor, a way that Malmö calculates the amount of green infrastructure in an area. The Green Space Factor factors in the building lot as well as the surrounding open space and ranges from 0, meaning a completely sealed area, to 1, meaning vegetation that is in contact with ground water. The minimum Green Space Factor that is encouraged by the city of Malmö is 0.5. Green spaces include general vegetation in the area, as well as constructed aspects such as green roofs. Green roofs are particularly interesting to this thesis because they have a visual appeal and act as adaptive climate change for increased rainfall (Kruuse, 2011). However, the Green Space Factor is also considered to widen the scope of green infrastructure included.

The importance of energy efficiency standards, mobility options, and green roofs lies in their use as tools *by* MKB and *for* residents. MKB uses these greening measures to make residential buildings more livable and to cut down on energy costs, thus making housing more affordable. At the same time, residents have access to these tools and greening measures, increasing the livability of their environments and allowing them to reduce their environmental footprints. These greening measures have as many implications and as much relevance to the Prism on the company level as they do on the neighbourhood level, and even on a more micro-level, for residents.

Analysis of the measures to be achieved in the new housing projects is compared to standards described above as well as between projects. Understanding how much projects diverge from the energy efficiency, mobility, and green spaces baselines is an indicator of targeted sustainability levels in the projects. This thesis also compares levels between projects to reveal any variation.

4.2.2 Analysis of communication

Communication of green amenities impacts the economy aspect of the Sustainability Prism and has implications for equity if it is uneven.

As described in the previous section, the way a housing project is communicated affects who will live in the housing and the intended audience. How sustainability measures are communicated is also important as it has implications for how green amenities are used in the marketing of the housing. It can aid in understanding whether eco-gentrification exists in Malmö.

The following questions were used to analyse the project's communication efforts:

- **Neighbourhood characterization:** How is the neighbourhood characterized? Who is the target audience?
- **Environmental description:** How extensive is the environmental description? What elements does it include?

Answering these questions was useful in understanding the differences and similarities between the projects and picking out the nuances in the project descriptions.

Neighbourhood characterization is an important trait as it sometimes indicates the aims of urban managers for the neighbourhood (i.e. raising the status of the neighbourhood). How the attractiveness of a neighbourhood is portrayed in an MKB description is demonstrative of how urban managers view the neighbourhood as well. A description that accentuates how quickly a neighbourhood is growing indicates promised growth while a more modest description might simply describe an area rather than promise any change. This characterization reveals the target audience and is related to the economy aspect of the Prism due to its ability to attract a certain class of residents to the area.

Environmental description is relevant to the discussion because it demonstrates the role of sustainability measures in the housing project and, more specifically, whether they are being used as a selling tool. The extensiveness of the descriptions may indicate whether the green amenities are of equal importance across projects and how much they are being used as an advertising measure. If so, the case for eco-gentrification is stronger.

Finally, these questions are related to the equity aspect through their comparison across housing sites. It is of course important to note that descriptions will vary based on the size and purpose of an apartment complex. After all, affordable housing may not need the same level of advertising due to already sizable demand for such housing. However, we can imagine a situation in which sustainability measures are relayed with equal effort for all housing projects. This has different consequences than if the description of sustainability measures differs across housing projects. In this case, the implication may be that the housing project is of higher importance to MKB. If environmental characteristics are more prominent in this advertising, it may indicate that greening measures are being used as a tool to appeal to prospective residents.

If inequity exists and it is linked with socioeconomic boundaries, the unequal distribution of communication will become a question of environmental justice. In particular, if greening measure are being used to sell, they may lead to changes in the character of a neighbourhood – especially, if they bring in wealthier residents and more investment to socioeconomically poor neighbourhoods.

4.3 Site selection

New construction projects were chosen according to their placement in the socioeconomic gradient of the city. This was initially determined through anecdotal evidence of the economic and social context of each neighbourhood and which construction projects came up in conversation with urban studies scholars and city planners. Using this background information, a map was made displaying the income gradient across the city of Malmö overlaid with locations of new residential projects (see Figure 4-1). All residential projects displayed are currently in construction.

This thesis investigated six apartment complexes predominantly located across two areas – one lower income and one higher income neighbourhood. While the gap in average income may not be extreme between these two neighbourhoods, the relative difference can offer insight into the differences and commonalities that are built into buildings across the varying socioeconomic areas. The two in relatively lower income neighbourhoods are Rönnen in Katrinelund and Föraren in Sorgenfri. Gjuteriet, Borrsnäckan, Histornet, and Sluringen in Limhamn are used as proxies for housing projects in wealthier areas. For comparison, Culture Casbah and Augustenborg Greenhouse are located closer to Rosengård and are on the lower end of the income gradient.

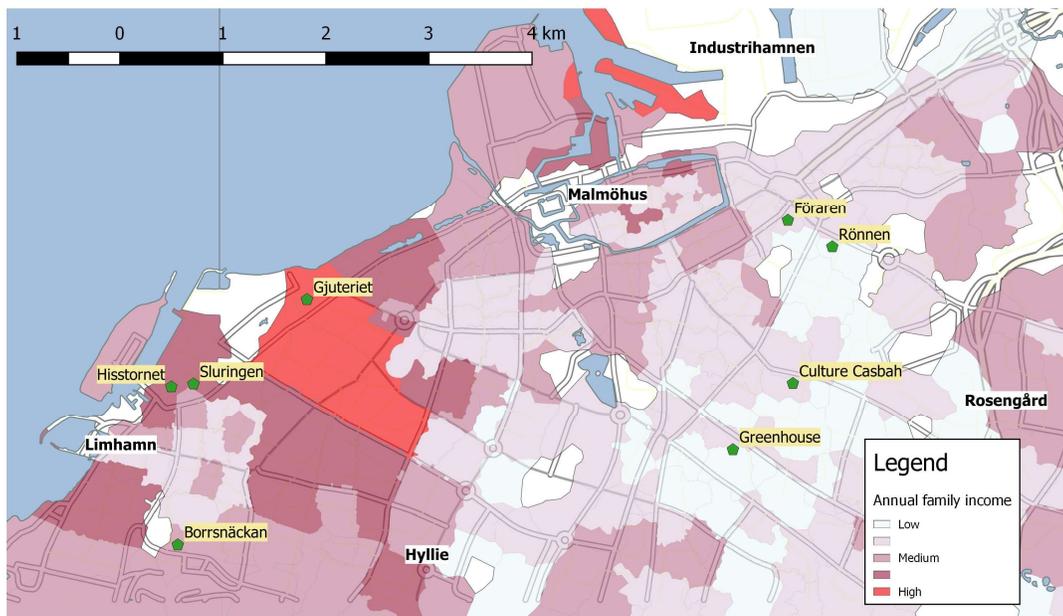


Figure 4-1 Residential buildings in construction across Malmö. Income is represented by data for förvävsinkomst in 2014. Min annual income: 88 337 kr; max annual income: 442 604 kr
Source: Data provided by © SCB (2015); Layer provided by © Lantmäteriet (2017)

While the locations of the projects are restricted to two main areas of the city, they are representative of the areas in which MKB is currently building new non-student housing – predominantly Limhamn and the areas near Sorgenfri. Several other projects across the city remain in planning stage rather than construction and were not shown. These were not chosen for research purposes due to lack of guarantee that any sustainability measures would not be changed when construction began.

Further, it is important to keep in mind that the buildings currently in construction differ from those several years ago. Before 2015, the municipality had a program called Miljöbyggprogram Syd, described in section 3.2, which regulated some environmental measures by including binding technical requirements for buildings built on municipal land. Now, environmental standards adhere to national regulations but any supplementary measures are the responsibility of the real estate company (Miljöbyggprogram, 2017). The city can encourage but cannot regulate MKB to introduce environmental measures in its buildings, leaving the onus on MKB to do so. Hisstornet and Sluringen were in the planning stage during Miljöbyggprogram Syd so Gjuteriet and Borrsnäckan are used to balance the potential influence of the Miljöbyggprogram Syd program.

The projects chosen are not in areas that are typically branded with sustainability, but this is reasonable and useful for several reasons. The projects are representative of the areas where MKB is building, revealing areas of interest for the municipal housing company and perhaps the city. They are also more representative of typical areas that does not include extremely innovative elements. This research can show whether sustainability measures are as important in communication and implementation in areas that are not typically branded as such. Because most residents in Malmö will not live in an area branded as sustainable, such as the complex in Hyllie or Bo01, this research is more relevant to the average resident. Finally, most of the literature reviewed focused on areas of the city that have been sustainability-branded – investigating other parts of Malmö will add to existing scholarship.

One limitation of the chosen apartment complexes is that they are not easily comparable in size and purpose. The new housing projects in Limhamn are larger than those in Katrinelund and Sorgenfri, contain more multi-bedroom apartments, and are located near the sea. In contrast, Katrinelund and Sorgenfri are located more centrally in the city with numerous other building complexes, shops, and restaurants around; they are also predominantly built to be affordable and are mainly composed of studios for small households.

4.4 Methods for data collection

Data for the second RQ were collected by interviewing stakeholders at MKB and the municipality, gathering data from project leaders at MKB, and conducting site visits. In particular, stakeholders within city planning and MKB are critical informants in this study because they can provide information on the city's social, economic, and environmental goals, as well as describe the relationship between MKB and the city.

The interviewees were used as primary informants where information on MKB's strategy for choosing sustainability measures, how sustainability is prioritized relative to economic growth and social goals, and information on the relationship between MKB and the city is not available in existing literature. Such an approach risked bias on the part of the interviewee's position at MKB or the city government as they may try to show their organisation in the best light. For this reason, responses were assessed with a critical eye, several actors from MKB and the municipality were interviewed to check for consistencies between them. A larger number of interviews is valuable in verifying reliability of the informants. In the end, 11 unstructured interviews were conducted lasting an average of 42 minutes.

In addition, quantitative data was interwoven with qualitative data in order to fortify the research. Quantitative data for the chosen indicators – mobility, energy, green factors – were collected from MKB for each project. These statistics are not available online so seeking them

out from MKB’s project leaders was of high importance. These indicators were compared to national and local regulations so as to better understand the level of MKB’s efforts.

A variety of documents, including legislation and online brochures from the city and MKB, added more information and perspective to the data. In addition, site visits were conducted to more fully understand the character of each neighbourhood; photographs from site visits can be seen later in this thesis.

Ultimately, this research required triangulation of interviews, quantitative data, and a variety of documents found online to gather a more complete stock of information. Table 4-2 describes more fully the aim of interviewing the various actors.

Table 4-2 Chosen informants and objectives

	Stakeholder	Objective
Contextual (Existing scholarship)	Urban studies scholars	<ul style="list-style-type: none"> • Understand the existing academic work around the city of Malmö • Hear about socioeconomic trends in the city and what has been studied already
Contextual (City)	Sustainability manager at MKB	<ul style="list-style-type: none"> • Understand importance of sustainability in overall company mission relative to other goals • Understand process through which green measures are integrated into housing • Understand which indicators are being used for sustainability measures • Understand whether differing sustainability measures are being put in place according to socioeconomic distribution
	City official in environmental department in Malmö	<ul style="list-style-type: none"> • Understand main sustainability goal for city of Malmö and drivers of the goal • Understand how economic and social goals are also addressed through sustainability • Understand how city work with MKB in integrating sustainability into buildings • Understand whether sustainability programs and advocacy differs according to socioeconomic distribution
	City official in city planning department in Malmö	<ul style="list-style-type: none"> • Understand goal of city planning department for Malmö and drivers of the goal

		<ul style="list-style-type: none"> • Understand how environmental, economic, and social goals are simultaneously being addressed • Understand relationship with MKB in planning new construction • Understand whether sustainability programs and advocacy differs according to socioeconomic distribution
	Communications at MKB	<ul style="list-style-type: none"> • Understand how what is communicated about building site is chosen – why are certain things emphasized?
Project site specific information	MKB project leader at site	<ul style="list-style-type: none"> • Understand sustainability measures to be implemented more fully and why they were chosen
	MKB	<ul style="list-style-type: none"> • Gather data for each project site on: <ul style="list-style-type: none"> ○ Mobility ○ Energy ○ Green roofs/gardens ○ Extra sustainability services (like bike repair station)

4.5 Limitations

The analysis and conclusions from this thesis have limited generalizability due to the scope of the project. The choice of six sites, though representative of MKB's current new projects, constitute a small sample size. At the same time, the choice of only projects developed by the municipal housing company limits the generalizability of these results to Malmö's greater housing market. Municipal housing projects were chosen to illustrate the transformation of the municipal housing company as the city's policies have become more neo-liberal over time.

The data gathered for the six projects benefited from layering of information from interviews conducted with the project leaders. The drawback was the unevenness of interview quality given that project leaders had a diversity of depth of knowledge and time available for interviews.

Among the six sites, comparability was difficult due to the unequal size of the housing complexes, environmental impact of the location (near the city vs the sea), and size and quality of accommodations. Nevertheless, this variation in type and size of housing is important as a finding as well as it indicates that the distribution of housing types across the city is unequal. This is easily seen when comparing the number of new apartments built in Limhamn to Söngfri and Katrinelund.

The sustainability measures chosen reflected which areas MKB has the greatest focus on in new housing. This makes them at once perfect and imperfect indicators. Because MKB aims to address these measures in its projects, data for each housing site is relatively available. On the other hand, using these three indicators takes the attention away from other sustainability initiatives such as waste management. The chosen sustainability measures are specific to multi-

family rental housing (the regulation of 75 kWh/sq m is only for a certain type of housing structure). They were also ultimately found to have minimal variation, indicating that energy efficiency, mobility options, and green roofs may not be unique enough to act as differentiators in residential housing.

5 Results and Analysis

This section begins with context gathering in order to understand MKB's place in urban management and MKB's own goals and challenges. The section will then present data collected about the various new residential projects, weaving in findings about communication and implementation of sustainability measures in housing developments to understand eco-gentrification through the lens of the Sustainability Prism's aspects as described in section 3.5.

5.1.1 Environmental justice in Malmö

In this section, I answer the first RQ posed in Chapter 1:

1. What has been the impact on environmental justice – as seen through the lens of Malmö's residential developments – as Malmö has transitioned from an industrial city to a knowledge city?

In order to provide for a broader discussion of environmental justice in Malmö, this analysis begins by addressing the city's transition from an industrial hub to an entrepreneurial post-industrial city, with a specific focus on the built environment. As described in Chapter 3, Malmö has rebranded itself as a hub for environmental sustainability, an appealing place to live with clean industries. Disamenities – the land housing the remnants of industry and manufacturing – have been replaced with green amenities like Bo01 and Augustenborg Eco-city. Symbolically, Bo01, the environmentally ambitious housing expo site, is located on the site of remains of the once burgeoning shipyard.

5.1.1.1 Industrial Malmö

Equity during Malmö's industrial period was heavily characterized by the strength of the welfare state. Miljonprogrammet is a classic example of how the government took initiative in addressing a lack of housing through an extensive program that focused on building many homes very quickly. At the time, Malmö's economy was booming thanks to the shipping industry. As residents moved into the cities to take jobs, they needed a place to live. The solution was the quick construction of a million homes with the ambition of building for a rising middle class (Stenberg, 2013). These homes were considered modern for their time, albeit utilitarian in aesthetic (Stenberg, 2013), and epitomized the idea of Folkhemmet, a belief strongly put forth by the Swedish Social Democrats.

Eventually, the developments came to be considered oppressive and ugly. Migration began from the "isolated, sterile" apartments to other parts of the city (Baeten, 2012: 28). With the coming of the 1970's came a critique of the monotony once lauded as modern building. This case shows the tenuous balance between equity and livability. While Miljonprogrammet housing was meant to provide equitable housing and touted livability through its modern design, the balance was weakened over time. The livability of the homes was diminished as tastes changed and styles became outdated. Equity also became vulnerable as the socioeconomic composition of residents began to change.

In the decades following the Miljonprogrammet, the housing areas began to show signs of ethnic segregation (Rodenstedt, 2014). Deindustrialization led to the loss of 25,000 jobs and 13% of Malmö's population left the city between 1970 and 1984. (Scarpa, 2016: 867). Homes of the Miljonprogrammet began to become inhabited by the immigration streams starting in

the 1990s (Scarpa 2015; Scarpa, 2016). The site of Miljonprogrammet homes, Rosengård, is characterized by large number of immigrants and lower-income residents. High numbers of residents in Rosengård's public housing structures are unemployed and receiving social assistance; more than half have a non-western background (Scarpa, 2016: 871).

Time has changed Miljonprogrammet housing. While it was once emblematic of the desire to equitably provide for the society in its abundant, uniform style, it has now become prone to issues of an aging structure. Piping, ventilation, and building materials are outdated and in need of renewal. Energy consumption measures were built before the global oil crisis in the mid-1970's when electricity was considered abundant and cheap but must now adhere to stricter energy consumption regulations set out by the national agenda (Stenberg, 2013). With reference to the Sustainability Prism, the era in which Miljonprogrammet housing existed had minimal concern for the ecology aspect. The housing can now be seen as environmental disamenity. The question of environmental justice is pertinent as the old homes are largely inhabited by lower-income residents who do not benefit from the environmental solutions seen in newer housing around city.

Environmental justice in Malmö during the industrial period is described through the Sustainability Prism to draw attention to the fragile balances between the four aspects. It is clear that the economy was heavily based in the shipping industry and ecology was pushed to the background. The reduced importance of ecology aspects is a result of the relative global inattention surrounding environmental issues before the 1970s, as well as an emphasis on the shipping industry's contribution to Malmö's economy. At the same time, however, Sweden's political environment stressed equity and livability as can be seen in Folkhemmet philosophy and Miljonprogrammet.

5.1.1.2 Post-industrial Malmö

In the past, the emphasis had been on providing for the needs of the population – in the realm of housing development, the shortage of homes was addressed by the Miljonprogrammet. Since the 1990's, however, the city's economy has transitioned into one more heavily based in human capital. The knowledge city or entrepreneurial city has shifted its priorities relative its industrial days. In the scope of the built environment, this has led to projects like Bo01.

5.1.1.3 Place marketing in present-day Malmö

The emphasis now, as part of the city's neo-liberal agenda, is to sell itself on the global marketplace. Rebranding has meant transforming Malmö's image to one that is "clean" and "green." It has also meant using environmental sustainability as a selling tool. Social sustainability is now reliant on the market mechanism in a balance between environmental and economic goals. Table 5-1 describes the city's transition through the lens of the Sustainability Prism.

The vision of urban regeneration in the 1990s was championed by the city's mayor, Ilmar Reepalu. Under his guise, the Øresund Bridge provided a connection to Copenhagen and the economic area that came with it; the Western Harbour turned into Bo01 and the Augustenborg neighbourhood was reinvented (Hambleton, 2015). Environmental and social sustainability initiatives were used to spur urban regeneration in the city; these were meant to attract investors and residents and trickle down to other parts of the society (Mukhtar-Landgren, 2008). During the development of Bo01, citizens were invited to contribute to the planning – landscape

architects were requested to imagine new and innovative gardens and organizers attempted to engage immigrant groups (though this proved to be mostly unsuccessful) (Jamison, 2008).

The Bo01, a key project that pushed Malmö into its post-industrial sustainability branding, impacted all aspects of the Sustainability Prism. It showcased ambitious environmental solutions (ecology), was a call to investors and residents (economy), revitalized the industrial area of the old shipyard (livability), and engaged citizens in planning (equity). However, the latter aspect, equity, was not a complete success: engaging with immigrant groups did not go as planned and the educational aspirations and ecological practices became “embodied in the expensive and rather impressive housing that was built in the area” (Jamison, 2008: 296). In this way, the economy aspect is seen as overshadowing the equity aspect. At the same time, the ecology aspect – the environmental sustainability of the development – was used to reinvent the city’s image.

Table 5-1 Transition from industrial to post-industrial Malmö

	Industrial Malmö	Post-industrial Malmö
Implication for economy	Economy centred in shipyard and other industries	Desire to attract clean industries; economic growth encouraged by investment in innovation and sustainability/green movement; goal of growing business and collaborating in the Øresund Region
Implication for ecology	Environmental sustainability not given attention relative to industrial needs	Brought to forefront; environment is used as a selling tool for city and a way to bring in investment; Bo01 redevelops former industrial area and integrates environmentally friendly solutions
Implication for equity	Addressed by government (e.g. Miljonprogrammet)	Increased reliance on market mechanism; equity must be balanced with environmental and economic goals
Implication for livability	Miljonprogrammet focused on providing affordable and modern housing in a uniform style	City’s competitive strategy leads to constructions like Augustenborg Eco-city, Western Harbour, and memorable structures like the Turning Torso

In terms of the Sustainability Prism, post-industrial Malmö has attempted to address goals relating to economy, ecology, equity, and livability. These are described in its strategic document “Comprehensive Plan for Malmö.” Adopted by the Malmö City Council in 2014, it describes the city’s long-term vision for development and integrates economic, social, and environmental objectives. The three main priorities, as described by the document, are to create a “close, dense, green mixed-function city”, become a “regional driver of green growth and employment,” and become a “venue for culture and democracy.” In the document, Malmö’s city planners show an understanding that social, economic, and environmental issues are not isolated; they need to be addressed together to create an “attractive and sustainable city” (Malmö stad, 2014: 3).

To briefly describe Malmö's three main priorities:

- **A mixed-function dense, green, and close city:** By pushing Malmö to grow inwards, the city can reduce its environmental footprint and increase its attractiveness. A high-density city lets residents have more sustainable means of transport like walking, cycling, and public transport within reach. The mixed-function addresses the city's economy aspect – more employment opportunities in the city can be created if a multi-purposeness in services, shops, and leisure activities exists.
- **A regional generator of green growth and employment:** Green growth has been marked as an avenue to encourage economic growth and increase employment. The Øresund Region is seen as a key area where cooperation between Sweden and Denmark can occur. Further, Malmö's housing, schools, and employment opportunities are pinpointed as factors that will cement Malmö as a regional generator of green growth and employment.
- **The city as a cultural and democratic arena:** This goal seeks to address the fragmentation in the city. Increasing social spaces such as parks, playground, museums, ensuring safety in the city through better public transport linkages, and making sure public health and participation exist the physical dimensions of the city are key to making Malmö more inclusive.

To achieve these three goals, the document goes through the objectives that need to be achieved. Some of these objectives include a prospective rail connection between Copenhagen and Malmö, densifying along approach roads to transform them into city streets, densifying greenery and building more parks, improving the public transport system so that all residents may move easily and safely, and building with energy efficiency and climate adaptation in mind (Malmö stad, 2014). The combination of these goals makes the city a more liveable place as residents can positively interact with their built environment. Equity is not explicitly mentioned but is implied through concerns over public health, public participation, and emphasis on housing, schools, and employment opportunities.

The dynamics between livability and equity, described as the gentrification conflict, can be seen as the central conflict here. Urban managers impact livability in urban areas through housing; the inclusion of sustainability measures such as energy efficiency standards, mobility, and green roofs can improve the livability, as well as affect the ecology aspect. At the same time, these same measures may upgrade a neighbourhood, driving up rent prices and changing the character of the neighbourhood. Equity, then, remains a concern as the focus on livability and neighbourhood lifting has the ability to marginalize and displace long-term residents. The play-out of this dynamic can be seen in neighbourhoods around Malmö, including Sorgenfri and Rosengård. Sorgenfri, an area discussed in this thesis, is set to transition from an industrial area to a lively mixed-purpose residential area. Similarly, Rosengård, the site of the future Culture Casbah, has been given a revitalization target by the city: often featured in the news as a poor socioeconomic area with high crime rates, the area is to be redeveloped into a habitable neighbourhood.

However, the extent to which Culture Casbah's sustainability measures are being used as a selling point is uncertain. The concern over higher rents and resultant displacement seems to

be a result of the new building's immensity, architectural distinctiveness, and placement in a lower income neighbourhood. Marketing by the Casbah's developers was more likely to emphasize the building's placement in the Øresund region and appeal to investors rather than tout its environmental sustainability.

5.1.1.4 Environmental agenda in post-industrial Malmö

The City of Malmö has established its environmental programme for the years 2009-2020 with four environmental objectives: 1) Malmö as Sweden's most climate smart city, 2) the urban environment of the future is in Malmö, 3) natural resources are managed sustainably in Malmö, and 4) in Malmö it is easy do right (Malmö stad, 2009). Planning for these areas together has created the sustainable leader and knowledge-based city that Malmö is today. Objectives 1 and 2 are the most relevant to Malmö's housing policy as it intersects with the environment. The *climate-smart* category includes targets related to efficient use of energy (reduce consumption by 20% by 2020), more renewable energy, reduced emissions (cut GHG emissions by at least 40% from 1990 levels), conversion of transport and travel behaviour, and adapting to climate change (Malmö stad, 2009). Malmö's *future urban environment*, the goal to make Malmö a centre for knowledge, demonstration, and sustainable urban development by 2020, includes targets such as sustainable city development, smarter resource use, a cleaner and quieter city, protected and expanded green spaces and aquatic environments, and good surroundings for Malmö's residents. The combination of *future urban environment* goals and the *climate-smart* targets shows how Malmö is using sustainability in its urban development as a way to reach targets while simultaneously making itself a centre for knowledge sharing and entrepreneurship.

The connection between these targets and sustainable building measures can be clearly seen in Malmö's housing developments. For example, residential buildings in Hyllie are outfitted with smart meters that can be used to monitor energy usage in order to make better energy consumption choices. Transport and travel behaviour has also been addressed in numerous ways, either through included car-pooling initiatives in residential complexes or accessibility to electric vehicles (Swedish Energy Agency, 2013). Finally, Augustenborg's Eco-city is an example of an area that built in measures to accommodate frequent flooding in the area (DAC & Cities, n.d.).

Considering whether the natural or built environment will hold dominance in an urban area – the green cities conflict – was, for a time, addressed by integration of sustainability measures in new construction projects. Before its closure in 2015, the Miljöbyggprogram Syd program indicated that urban managers had deemed the importance of the natural environment on par with the importance of urbanization. The ending of the Miljöbyggprogram Syd program, as legislated by the national government, has aided the transition to a market-led inclusion of greening measures in urban development. Now, urban managers like planners at MKB are encouraged by the government to develop in an environmentally sustainable way, but the company's own R&D program has taken the helm in developing advanced environmental solutions.

Growth management conflict – the balance between economy and ecology in the Prism – asks whether unmanaged development can provide high quality living environments. In the case of neo-liberalising cities like Malmö, it appears that urban managers have been amicable to the increased influence of the market in urban development. In fact, urban studies scholars claim that greening measures are being used as a selling strategy for the city. They point to projects like Bo01, Augustenborg Eco-city, and Greenhouse as developments that have used

environmental sustainability as a tool for branding the city and making it appealing to new residents and investors. Market-aided development facilitates the inclusion of sustainability measures in new buildings. If projects that use innovative greening strategies are being used as part of private company portfolios in order to garner new projects, quality of built environments is raised and residents may benefit from pioneering enterprises.

In these projects, the aspects of economy, ecology, and livability come together. Developments like Bo01 pushed Malmö to the forefront of the sustainability discourse, marketing the city as a space for sustainability-related initiatives. This has implications for the economy of the city as its clean image attracts new human capital-based industries. At the same time, these developments affect the ecology aspect by integrating solutions for environmental challenges and climate adaptation. Further, by creating a mixed-purpose space, livability is positively impacted. Equity is not explicitly mentioned, but rather seen as a consequence of livability. If vibrant, mixed-purpose housing is provided, as in the case of Culture Casbah, a whole neighbourhood can be raised up. This strategy melds economic, social, and environmental goals; using the Sustainability Prism, however, this thesis was able to separate out equity from livability. Improving livability does not necessarily translate into improvements in equity.

Equity and livability are both central foci in the city's agenda. Both affect how people live and interact with their environment; they also describe the impact that the environment has – from micro-block to larger urban space – on people. However, projects like Culture Casbah show that livability has become more influential than equity in the planning process, perhaps as a result of an increased focus on the ecology aspect of the Prism – a consequence of the city's use of environmental sustainability in its rebranding efforts.

The next part of this thesis assesses green amenities in the city of Malmö. The integration of sustainability measures in new housing projects shows the movement of the ecology aspect to the forefront. In the city of Malmö's agenda, it is closely tied with economic goals and equity goals. Ultimately, studying current housing projects can reveal more about the modern state of environmental justice in the city.

5.2 MKB in context

MKB is the municipal housing company whose projects were investigated in this thesis. Interviews with urban studies scholars, stakeholders at MKB, and employees in the municipality revealed the difficult balance that MKB holds in achieving financial, environmental, and social sustainability. The municipal housing company's role in the Miljonprogrammet project was reflective of the city's welfare-focused agenda of the 1960's and 1970's. The 2011 regulation that provided MKB more autonomy, however, also forced it to become more attentive to generating revenue. In this way, the importance of equity is now in balance with the economy aspect for the company. This balancing act extends into the company's attempts to harmonise its own agenda with the city's agenda.

MKB is fully owned by the municipality, but is not the housing or planning department of the municipality. This is an important distinction because while the company is influenced by the politicians in power and has a mandate to be profitable by the national legislation, it maintains autonomy in its decisions of what to build and where. This can be difficult because the city has its own expectations and wants to set requirements for MKB. The city's planning and environmental departments may have their own agenda for the built environment but must

remember that MKB is independent; ultimately, they must treat them as any other construction company (Zinkernagel, 2017).

Given that MKB's board is made up of politicians, some of the decision-making may be attributed to guidance provided by the municipality (in this case, the Board is largely made up of politicians whose political parties welcome the increasing power of the market). At the same time, MKB is independent in choosing how to fulfil certain goals that the municipality has set out. The Culture Casbah to be built in Rosengård is an excellent example of MKB's efforts to meet the city's demands for "raising" the neighbourhood. As interviews with the environmental management at MKB reveal, both environmental sustainability and social sustainability are targeted by the company. Now, the problem of segregation and polarization has been identified and MKB is taking responsibility in addressing it by creating multi-purpose housing and "raising" neighbourhoods through new housing projects (Holmquist, 2017, personal interview).

Environmental practices are decided by a combination of the city and MKB. MKB accounts for the city's goals in its process of prioritizing its environmental impacts (Zinkernagel, 2017, personal interview; Holmquist, 2017, personal interview). MKB's environmental practices can be presented in three parts. The first is that which is regulated by the national government's laws. The second is MKB's own goals based on targets the company has set for itself, mostly surrounding impact on climate change. The last component is an R&D-like practice that aims to try out new solutions for various projects. Typically, environmental practices are created based on where MKB has identified its greatest environmental impact. Mobility is a strong focus area currently given MKB's climate change reduction targets so the company has worked on developing carpool solutions and building in ways that might change driving and mobility behaviour (Holmquist, 2017, personal interview).

The environmental standards in each project are guided by a list of criteria. These criteria are heavily focused on energy and mobility solutions. They also probe into the customer's environmental experience and construct a plan for the environmental values to be communicated (Holmquist, 2017, personal interview). According to MKB's 2016 Annual Report, the total energy consumption for MKB's buildings has decreased from 299 gWh in 2004 to 297 gWh in 2016. While this decrease may not seem significant, it is interesting to note that the solar energy capacity by MKB has increased from 0 in 2004 to 104 kWh in 2016 (MKB, 2016: 9).

The Annual Report further highlights MKB's environmental initiatives, setting a goal of reducing the climate impact per apartment by 20% by 2018. By 2016, the company had already achieved an 18% reduction. Almost a third of new project (31%) have an energy ambition of 60 kWh per square meter. The Greenhouse project is highlighted in the report; the report mentions that many of the environmental initiatives from the Greenhouse, like the mobility solutions, will also be integrated into new projects (MKB, 2016: 10).

Aside from these environmental practices, MKB is also focused on developing its business, focusing on being a customer's first choice and having inclusive and passionate employees. The biggest problem MKB currently faces is addressing the housing shortage in Malmö. The company has set a target for building 750 new apartments every year over the course of the next three years (MKB, 2016; Holmquist, 2017, personal interview). In 2016, most new projects were set for Limhamn – 540 new apartments. In contrast, there were 106 new apartments scheduled for Sorgenfri (MKB, 2016: 7).

Social issues have always been at the core of MKB's business, even before the increased focus on environmental sustainability. In addition to building to meet housing demand, MKB focuses on other social issues like safety and education in the city. The company does work to make Malmö's neighbourhoods safe and has worked with schools in deprived neighbourhoods like Rosengård to provide educational activities and internships for students (Holmquist, 2017, personal interview).

MKB has the difficult job of balancing its business practices with its social and environmental goals as well. Because the municipality does not have the responsibility of providing social housing, MKB has taken on the role of providing affordable housing for Malmö's residents. There is no designated target group for the new construction, but MKB tries to build as cost-effectively as possible to create affordable options for new residents (Holmquist, 2017, personal interview).

Public housing came to forefront after World War II when the accelerating birth rate exacerbated the already present housing shortage. The Miljonprogrammet addressed this issue through extensive construction of new housing. Currently, these homes are facing the need for renovation and more investment in energy efficiency improvements. This concern, combined with the housing shortage and regulation that public housing companies must be profitable, creates some complexity around addressing social responsibility (SABO, 2013).

One actor that has been proactive in addressing the housing shortage is SABO. SABO is the Swedish Association of Public Housing Companies, bringing together municipal housing companies to provide rental apartments for residents of Sweden. The aim of Sweden's public housing sector is to provide housing for everyone regardless of age, ethnicity, and gender (not social housing) and account for half of Sweden's rental stock (SABO, 2016).

SABO highlights its three current challenges as constructing new housing, sustainable renovation and improving energy efficiency (especially in Miljonprogrammet housing), and migration and integration. Given the increasing number of asylum seekers seeking refuge in Sweden, this last challenge is intensifying the need for a higher amount of housing at affordable rents. The complexity lies in constructing sustainable housing and renovating existing housing without increasing the rent (SABO 2016).

SABO has been facilitating the construction of new dwellings with its Kombohus family. Consisting of easy to replicate ("standardized") residential buildings that come in different sizes, the Kombohus apartment buildings were developed to reduce construction costs and to be built at speed. Lower construction costs would translate into lower rents, thereby achieving the goal of making public housing open to everyone. At the same time, the houses have high energy requirements, thus reflecting SABO's commitment to improving energy efficiency. Plans for these Kombohus apartment buildings are being taken up by municipal housing companies like MKB to build more and quickly (SABO, 2016). Kombohus apartments become relevant to the discussion in the next section.

5.3 Presentation of cases

This section presents the six housing sites with detail on their purpose, neighbourhood, sustainability measures, and communication schemes to better understand the role of green amenities (the sustainability measures described in 5.2) in environmental justice in the city. These details are presented for each housing project based on data collected from MKB's

project leaders. Photography from on-site visits is also provided for more tangible content. A summary of housing project details is provided below in Table 5-2.

*Table 5-2 Implemented sustainability measures. "--" indicates an unknown data point.
Source: MKB (2017), personal interviews with project leaders noted under project name*

Building project	Apartment description	Energy measures	Mobility measures	Presence of green roof and green factor
Rönnen in Katrinelund (Kindt, J.)	39 new apartments: 19 1-room, 20 2-room	60 kWh/sq m	0.7 parking spaces per person; Carpool; Bike pool Off-site garage	No green roof
Föraren in Sorgenfri (Engman, J.)	54 new apartments, ranging from studios to 5 room apartments; 10 disability-accessible apartments included	70 kWh/sq m	0.6 parking spaces per person; Carpool; Shared garage	Yes, green roof will be included; green factor: 0.5
Borrsnäckan in Limhamn (Klemt, S)	76 new apartments: 6 1-room, 29 2-room apartments, 33 3-room, 8 4-room	--	0.6 parking spaces per apartment	Yes, green roof will be included; green factor: 0.68
Gjuteriet in Limhamn (Klemt, S)	151 new apartments: 18 1-room, 32 2-room, 62 3-room, 33 4-room, 6 5-room	Set of four buildings with varying energy efficiency, ranging from 62 to 75 kWh/sq m	-- Carpool; Bike pool; Garage	Green roofs will be included
Hisstornet in Limhamn (Klemt, S)	162 new apartments, 1 1-room, 78 2-room, 73 3-room, 5 4-room, 4 5-room, 1 6-room	67 kWh/sq m	0.7 parking spaces per person; Carpool; Bike pool; Garage	--
Sluringen in Limhamn (Klemt, S)	128 new apartments, 9 1-room, 61 2-room, 24 3-room, 34 4-room	67 kWh/sq m	0.7 parking spaces per person; Carpool; Bike pool; Garage	--

The communication scheme is described for each project based on information found on the MKB website and any additional information that was found online and onsite. Communication presented on the MKB website detailing the amenities of MKB's new housing developments largely follow a similar template. The descriptions begin with a short summary

of the neighbourhood and site of the building, then continue into the number and type of apartments that will be available, and end with the environmental work done in the building. Additional documents often include floor plans, though extra brochures describing the projects are sometimes also included.

5.3.1 Rönnen

Rönnen in Katrinelund is built as a residence for small households and is made up of studio apartments and one bedroom apartments. As seen in Figure 4-1, it is located in a lower-income neighbourhood bordering Sorgenfri. The description on the website notes that “area is currently characterized by mainly rental units from 1960 to 1970,” most likely referring to the homes of the Miljonprogrammet (MKB, 2017). Following on-site visits, it became clear that development in both areas is largely united into one project. Thus, this research assumes that many of the development initiatives taken up in the Sorgenfri area influence the Katrinelund sub-area.

Rönnen is being developed according to SABO’s Kombohus plans, but also contains elements proposed by MKB. Mobility was a primary focus area during the development as Rönnen is being built on a parking lot adjacent to another apartment complex. The tight conditions mean limited space but Rönnen meets the city’s regulated parking to apartment ratio.

Rönnen is being built with no garage, but has a car pool and bike pool to add to mobility options. These measures are important as they meet the city’s regulations for mobility to be included in the housing plan. Per city regulation, each resident must have access to a parking spot or a parking lot must exist within 400 m of the building. Rönnen fulfils this latter requirement and the additional options of shared cars and bikes alleviate the burden of not having a car park. The information on Rönnen’s extra mobility measures like the car pool and bike pool is not included in its online description.

Rönnen’s communication plan is simple. This communication plan is simplified because apartments in the area are expected to be in high demand due to lower rents (Ihre, 2017, personal interview). Like the Kombohus plan, the description on the website follows a standardized template that does not provide any extraordinary background such as 3D visualizations or videos. The on-site visuals depict Rönnen as being “sustainable city living,” as shown in Figure 5-1.

Rönnen can be analysed through the economy aspect in two ways. For MKB, the financial stress of construction is low; optimistically, this means the incentive for developing more buildings based in the Kombohus plan is greater and could help fill the gap in housing. For the neighbourhood and community, the simple communication plan does not indicate a special focus on attracting any type of resident. The low-cost, affordable project is in likely in line with the rents in the neighbourhood and would not alter the socioeconomic composition drastically.



Figure 5-1 Visuals onsite promote the new housing area as “39 rooms for those who like sustainable city living.”

Source: Photo taken by author.

Rönnen goes well beyond the energy efficiency standards set by national regulations (75 kWh/sq m) by implementing an energy consumption level of 60 kWh/sq m. Although the idea to include a green roof was debated at one point, MKB ultimately decided against it given the large amounts of green space surrounding the complex (Kindt, 2017). Among the six project sites, Rönnen had the lowest energy consumption; this low energy requirement combined with the low-cost construction makes Rönnen a model for other housing sites. It shows that livability and ecology can be achieved in one home. Services like the bike pool and car pool provide tools for residents to reduce their environmental impact and increase the livability of a housing complex.

5.3.2 Föraren

On MKB’s website, Sorgenfri is described as going on “an exciting journey from small-scale industrial city to...modern and creative” (MKB, 2017). The neighbourhood is described as yet to be explored though the city of Malmö and many developers want to create a new residential area. The aim, as described by MKB, is for Sorgenfri to become a multi-purpose place, facilitating a mix of cultural life, artistic activities, and *fikas* in cafes and restaurants. “Förebilder för det nya området är både Möllans brokiga folkliv och Västra hamnens hållbarhet” says the website meaning, “Role models for the new area are both Möllans rich/varied folklife as well as the sustainability of the western harbour” (MKB, 2017). The sentence refers to the neighbourhood of Möllevången, once a working-class neighbourhood that has since become home to lively day and nightlife and to the transformed area of Western Harbour. The description clearly evokes MKB’s aim for Sorgenfri to become a lively neighbourhood that appeals to new business and investors. The area appeals to residents who want to spend money and live in a vibrant area for shopping and eating out. Livability is emphasized in the description as residents

can live in and be entertained by their physical space. The promised amenities are likely to come with an increase in rent levels as the neighbourhood becomes more attractive.

When describing environmental work, MKB notes the focus on low energy consumption which it has achieved at 70kWh/sq m in this building. The energy consumption meets the national regulation but does not go beyond. The remainder of the paragraph follows the MKB template of environmental work in new production mentioning that issues such as “damp proofing, radon, legionella, acoustics, comfort and natural light” are addressed. The online description includes a standardized statement about the housing project’s environmental measures. Environmental work in the building is noted with mentions of lower energy consumption and MKB describes addressing issues of “damp proofing, radon, legionella, acoustics, comfort and natural light” within the apartments (MKB, 2017). Outdoors, MKB writes of the permeable land surfaces it is installing, as well as amounts of green space. These ecology-related descriptions are simple statements that do not herald the sustainability measures as innovative or advanced. A comparison of communications demonstrated that the above was a standardised description that was included across several housing sites.

Mobility measures are not included in the project site description. They are only slightly lower than the regulated measure of (0.6 vs 0.7 parking spaces per apartment). Further, despite the provision of a carpool, the parking to apartment ratio has not reached the ambitious level of Greenhouse (0.4).

Green roofs, also not mentioned in the web description, will be included in Föraren, with an overall green factor of 0.5. Of the two project sites for which the Green Factor was attained, this was the lowest.

MKB’s online feature of Föraren includes brochures, plans, and 3D renditions of the area. This is more additional information than present for Rönnen, but may be expected given that the building will contain 54 new apartments ranging from studios to 5 room apartments with 10 apartments included for persons with disabilities. In other words, Föraren is built to include more than just in-demand, affordable housing.

Further, on-site promotional material seen during a site visit highlights the neighbourhood’s transition and the extra sustainable measures that will be taken in the area. The construction site contains several posters that depict the initiatives that will be included in the area. These include plans for the garage, a garden, and a bus park. These visuals all show elements of vegetation and include strategies for maintaining sustainability. Another poster describes something called “Spårvägstorget,” which promises to be a place for a variety of activities – fashion, play, cafes, shopping, and anything the imagination allows. The description for this place attempts to combine the industrial past of Sorgenfri with its modern multi-purpose potential – made up of concrete but also an engineered soft surface, the area can be reminiscent of Sorgenfri’s past while also conducive to activities like yoga. This multi-purpose environment makes the physical space more liveable for residents as multiple services are provided to them by the physical space of their block (i.e. cafes, restaurants, residence). This description also confirms that the aim is to revitalize Sorgenfri and make it appealing to new residents and investors, making it relevant to the economy aspect of the Sustainability Prism.

Another poster that was seen described the recycling and waste facilities that will be part of the area. “A Great Step for Sustainability” announces the poster, going on to talk about the apartments, offices, and studios that will be in the area. “This is a place for new habits,” the

poster continues. ReTuren, the subject of the poster, will be a recycling house for waste such as paint cans, incandescent lamps, solvents, and other hazardous waste. There will also be a station with tools for repairs. A space in the basement for collected garbage will transform the waste into biogas. The ReTuren facility affects the ecology aspect by providing a place for recycling, tools for repair, and waste transformation.

The description of ReTuren presents one of the ways that the development in Sorgenfri will touch upon the economy aspect; its use on the promotional poster indicates how it is being used as a way to advertise the neighbourhood to new residents and make it appealing to incoming business. At the same time, the ReTuren facility makes this project in Sorgenfri more liveable and touches upon the ecology aspect.

More of this information in the posters can be seen in the photographs of posters in Appendix A. The key takeaway lies in the amount of on-site information that is presented and how much of it relates to green living. The neighbourhood is characterized as undergoing a shift from industrial to one of vibrant living; the space promises to evoke this appearance of hard concrete and a variety of activities. In a way, environmental measures are used as a selling point for the neighbourhood, making it appear as a liveable and vibrant place. However, much of the ecology aspect is obscured by the greater emphasis on livability.

5.3.3 Borrsnäckan, Gjuteriet, Hisstornet and Sluringen

The four projects in Limhamn are studied together given existing gaps in data provided by MKB. Further, Hisstornet and Sluringen began construction in 2015 and may have still been under the influence of the Environmental South Building Programme (the program is mentioned in Hisstornet's description on the MKB website). The similarity in online descriptions and development strategies due to projects' locations in the same neighbourhood makes studying them together more logical.

The four buildings are located in Limhamn in one of Malmö's "most desirable neighbourhoods" (MKB, 2017). With both of the residential complexes, 517 new apartments will be built, ranging from studios to 5 room apartments. In the materials online, the apartment buildings are consistently described as being located in a place close to the views of the sea as well as the city. The description of the area on MKB's website describes the soul of Limhamn and the charming array of shops, restaurants, and cafes that exist in the town. Moreover, the residential building is described as close to nature and the sea, with an emphasis on the "vast green areas, beaches, and marina." Other amenities mentioned include playgrounds, shops, dog parks, and a popular restaurant known for its sea views and live music. Once again, the description highlights the livability of the area, emphasizing the multi-functionality of the neighbourhood. The description can also be seen through the economy aspect: it describes an appealing area for new business and residents who can afford the area. The projects in Limhamn follow Föraren's example of presenting the area's industrial past as reinvented selling point. In Borrsnäckan, the "top apartments have views of the limestone quarry and the white limestone reflects daylight"; the description continues – "from a new and modern residential area, one of Malmö's most attractive locations with views over a barren but stunning beautiful landscape where time has stopped" (MKB, 2017). Figure 5-2 shows Sluringen's marketing emphasis on living close to the sea.

In terms of environmental measures, very few are called out specifically. Online descriptions include a standard paragraph that is also used for Föraren. It is likely that green roofs will be

included in the buildings as noted by project leaders, but this is not noted in the online description.

The buildings have a variety of energy efficiency standards, dependent on the size of the complex. These range from 62 kWh/sq m in one of the buildings in the Gjuteriet project to 75 kWh/sq m. Assessing these energy consumption measures through the ecology lens reveals housing projects that are of varying ambitious in their energy standards. However, energy consumption is dependent on the size of the housing project. Projects like Hisstornet and Sluringen that have energy consumption of 67 kWh/sq m might actually be ambitious for their size and proximity to the sea (as winters may be colder by the coast).



Figure 5-2 On-site promotional material at Sluringen mentions "151 new homes for those who like proximity to the sea"

Source: Photo taken by author.

Mobility options are of high importance in Limhamn as the area is further away from Malmö's centre than other neighbourhoods. The apartment complexes have higher car to apartment ratios. Excluding Borrsnäckan, the chosen housing projects have allocated parking, car pools, and bike pools. However, these extra mobility options have not reduced the ratio of apartment spaces to cars which meet the regulation at 0.7 parking spaces per apartment. Assessing through the Prism, these options provide residents with ways of curbing their carbon emissions (ecology) and facilitate transportation in the physical environment (livability).

Gjuteriet is the only studied housing project in Limhamn that does not contain information about environmental work in its online description. This may be because the focus of the project was to provide future residents with good apartments. Extra sustainability standards, like those seen in Greenhouse, are of lesser importance relative to building apartments that are of good quality, easy to rent out, and meet energy standards (Klemm, 2017, personal interview).

This may explain the high parking space to apartment ratio – developers are more focused on providing as many options as possible for residents, improving livability, rather than undertaking an ambitious environmental focus that would affect the ecology aspect.

Overall, assessing these project's implementation and communication through the Sustainability Prism shows how much livability is emphasized in implementation and communication. The multi-functionality of a neighbourhood appears to be one of the most significant components in selling a place to residents and businesses. The economy is aspect is also valued heavily: the descriptions present the neighbourhood as a vibrant place for new business.

5.4 Equity in sustainability measures

The last aspect, equity, is investigated by comparing implementation and communication of sustainability measures across the different housing sites.

5.4.1 Equity in implementation of sustainability measures

Implementation of sustainability measures was largely similar across the housing sites. A reason for this may be that typical residential housing is not the recipient of green amenities as much as flagship projects like Bo01 and Greenhouse.

Energy efficiency measures ranged from 60 kWh in Rönnen to 75 kWh in Gjuteriet. These energy consumption levels largely go beyond what is regulated but only Rönnen is marked by an exceedingly energy efficient level. This is interesting because Rönnen is located in a lower-income neighbourhood and is meant to fill the housing shortage with affordable apartments. This finding is in line with Fossum's (2017, email) judgement that sustainability measures are more likely to be found in areas that are on the poorer socioeconomic spectrum. This finding also points to a potential solution for filling the housing shortage with low-cost, environmentally-efficient housing.

Most housing projects have plans for parking space to apartment ratios around 0.6 to 0.7, well above the ambitious 0.4 in Greenhouse. Most interesting was the high ratio and preponderance of mobility measures in Limhamn. In addition to car pool and bike pool services, parking will be provided for residents. In Limhamn, mobility services are used to improve livability while mobility services in areas like Sorgenfri are used to complement lack of parking and shared garages (building garages in the city centre is more difficult given spatial restrictions).

Although data for green roofs was not found for all housing projects, the majority of those surveyed have green roofs planned. The Green Factor obtained for only two projects due to lack of information from interviewees but demonstrates that housing in Limhamn (0.68 in Borrsnäckan) has a higher green factor than that in Sorgenfri (0.5 in Föraren). It may be easier to acquire a higher Green Factor in Limhamn due to the existing natural green space around the housing.

The limited difference in implementation is likely a result of the diminished value of environmental measures in typical residential housing. Flagship projects like Bo01, Augustenborg Eco-city, the Greenhouse, and the Hyllie smart grid were built with a focus on innovative environmental solutions. Bo01 promised to be the first carbon-neutral district, Augustenborg led the front with green roofs, and Greenhouse and the Hyllie development

have focused on energy efficiency by integrating renewable energy and building smart grid infrastructure. More typical rental housing, however, meets regulated environmental standards but does not make ambitious strides. Rather, the focus is on up-levelling existing neighbourhoods to bring in investment and higher-income residents.

This can even be seen in flagship projects like Culture Casbah that are now more focused on building a multi-purpose space that is conducive to a vibrant living space. They encourage a mix of wealthier populations with lower income populations and rely on the project's unique architectural value to sell. The same is seen in more typical housing as housing sites like Föraren and the projects in Limhamn emphasize that the area will be multi-purpose.

What does this mean for environmental justice?

That environmental sustainability measures researched in this thesis were found to meet regulations but not ambitiously exceed them throughout the neighbourhoods of Malmö. The equitable distribution means people of different socioeconomic classes (in the wealthier Limhamn neighbourhood and the less wealthy Sorgenfri area) have equal access to tools that can reduce their environmental footprint and allow them to live more sustainably. Extra resources like the recycling centre and tool station in Sorgenfri provide even more access to tools for residents of the area. Additional tools such as these are some of the ways that housing projects stand out in environmental standards.

Green amenities in typical residential housing are unlikely to lead to inequity given that their ambition levels are largely moderate. In fact, the sustainability measures studied in this thesis may not even be categorized as green amenities as they do not drastically exceed regulations. Green amenities, then, could be used to describe extra environmental sustainability measures like ReTuren in Sorgenfri's Föraren.

The true problem around equity seems to lie in the distribution of apartments across neighbourhoods. Limhamn, an already expensive area, has been the recipient of the most recent housing projects. Meanwhile, new housing projects in less wealthy areas are being built to improve the neighbourhoods' images. This means rent prices in these socioeconomically poor areas will increase as the attractiveness of the neighbourhood increases. Affordable housing, like the Rönnen project, is sparser compared to projects like Sorgenfri and Culture Casbah. Thus, where apartments are being built, livability exists. Equity in amount of new, affordable apartments, however, is not guaranteed.

5.4.2 Equity in communication of sustainability measures

Communication of sustainability standards in housing varies across socioeconomic areas in Malmö. Much of this variation can be attributed to the purpose of the housing project. Further, it is not so much variation in amount of content around sustainability standards, as variation in amount of content itself. Where ample promotional materials are included, it is not for the sake for advertising sustainability measures – rather, sustainability measures are one of several aspects that are promoted.

For example, the project in Sorgenfri had the most on-site communication of sustainability measures, including additional measures like the recycling site and the tool station. The other chosen case studies exhibited less differentiation in on-site promotional materials. Rönnen's communication was very simple as the housing project is built to be affordable and apartments

will likely not need extra advertising to pique demand. While the Sorgenfri area has been targeted as one to be revitalized, Rönne is one of MKB's Kombohus buildings, quick and cost-effective to construct. These differences in projects are linked to purpose of the housing project. Moreover, the project in Sorgenfri generally had more promotional content available in addition to the details about the extra sustainability measures.

The projects in Limhamn and the project in Sorgenfri had mild variation in their online communication compared to Rönne. Built to accommodate larger families, and in Limhamn's case at more expensive rents, they had more 3D visualisations included in the descriptions. These visualizations, however, did not imply any unique environmental measures that might be used as a selling point.

Overall, the chosen sustainability indicators – energy efficiency, mobility options, and green roofs – were not used to differentiate a housing project. Energy efficiency was only explicitly mentioned in Rönne. Other measures that were implemented in Rönne, such as the car pool and bike pool, were not mentioned in online or offline promotional materials. Sustainability measures may be communicated when the purpose is to promote the neighbourhood – in that case, they are one of the many aspects being communicated and are linked to how they promote a multi-purpose liveable space.

What does this mean for environmental justice?

As described previously, the environmental justice discourse centres around the procedural and distributive inequities that occur as public and private actors make decisions around green amenities and disamenities. For communication of green amenities, the impact on equity lies in how the communication is targeted and to whom. Sustainability measures may be communicated to sell a housing project to a wealthier creative class. The moving in of this new population has the power to further increase the attractiveness of the neighbourhood, raising rents in the area and leading to gentrification.

In the case of Malmö's new housing sites, it is unlikely that sustainability standards are being used as a selling tool. Though they may once have been used in projects such as Bo01 and Augustenborg Eco-city, the focus has now shifted to creating multi-purpose housing. The concept of multi-purpose housing integrates environmental measures, but is mostly invested in creating a mix of residential, commercial, and leisure options for residents. In the case of Sorgenfri, a multi-purpose solution included the interaction between the environment, society, and business. The merging of these aspects can ultimately create a more liveable environment that will make the neighbourhood more attractive.

6 Discussion

This chapter presents a discussion of the case studies and ties in the theoretical framework and literature review to provide some conclusions for environmental justice in Malmö and more generally. The chapter uses two main sub-headings to summarize the key findings from this research. The learnings in sub-headings are as follows:

1. Industrial Malmö was characterized by tension between equity and livability
2. Post-industrial Malmö characterized by tension between ecology and livability

6.1 Industrial Malmö was characterized by tension between equity and livability

Industrial Malmö can be described through its heavy emphasis on the economy, equity, and livability aspects of the Sustainability Prism. With an economy strongly based in the shipping industry, the ecology aspect was not deemed important until the city was forced to reinvent itself. Meanwhile, the equity and livability aspects were almost conflated due to the stress on *folkhemmet* in national politics. The Miljonprogrammet project is an excellent example of Swedes building what was then considered modern housing for all residents of the country. The uniformity of the housing was seen as equitable and contemporary. Over time, livability of the housing lessened and equity followed suit.

In contrast, present-day Malmö can be characterized by a tension between all aspects as its urban regeneration strategy can use ecology and livability as selling points for economic growth. According to the neo-liberal strategy, equity is supposed to be positively affected through the trickle-down of the other aspects.

The study of the interplay of aspects allows us to gather context for environmental justice. For example, this research isolates the emphasis on economy, equity, and livability as a factor that led to environmental negligence in industrial Malmö. While the emphasis on the shipping industry may be obvious in diminishing the importance of environmental characteristics, the significance of equity and livability at that time is more difficult to discern unless these aspects are studied individually. Yet, these also play a role in defining environmental justice in the city as they demonstrate the value that policy makers place on equalizing society and creating a physical space conducive to living a healthy and productive life. These characteristics are part of the historical and cultural context that has determined the policies and values in present-day Malmö.

In the case of Malmö, the Social Democrats were more focused on modernizing and providing housing for the masses and paid no attention to environmental solutions in the housing. This has set the scene for environmental justice today as it shows how policy-makers value the importance and interplay of aspects like ecology. Policies of the past now mean Malmö is seeking its reinvention in the opposite. Ecology is now pushed to the forefront and used to bolster economy and livability (as seen in Bo01, Augustenborg projects, etc.). Environmental justice has become an issue as the focus of the economy has shifted away from its industrial days and outdated avenues for ensuring equity, like the Miljonprogrammet, are now in need of renovation to meet environmental standards. Miljonprogrammet housing has set the stage for environmental justice issues as it is largely occupied by lower-income populations (as seen in Miljonprogrammet housing in Rosengård). In these homes, residents have less access to tools

that reduce their environmental impact but are living in affordable housing. Renovations will, and have, raised rental prices that lead to housing unaffordability (Baeten *et al.*, 2017; Baeten & Listerborn, 2015).

6.2 Post-industrial Malmö characterized by tension between ecology and livability

In present-day Malmö, environmental standards are largely equitable across socioeconomic areas. The studied environmental measures concerning energy efficiency, mobility options, and green roofs were at least considered in all the chosen case studies and implemented in most housing projects. However, the ambition levels are mostly moderate compared to other flagship developments like Greenhouse and Augustenborg Eco-city.

Although a direct link is difficult to prove, the normalization of many sustainability solutions can be attributed to their previous use and success in other projects. For example, Eco-city Augustenborg advanced the installation of green roofs for storm water run-off and Bo01 pioneered a neighbourhood relying completely on renewable energy. Based on projects like Greenhouse and Eco-city Augustenborg, MKB knows the value of R&D in environmental measures. This is an important practice as it pushes the overall standard higher. However, integration of these sustainability measures in residential housing that is representative of typical rental housing is more restrained.

The more significant threat to equity is the unequal distribution of housing across the city. Although Malmö faces housing shortages, Limhamn is absorbing the vast majority of new projects, while affordable housing, like Rönneby, is responsible for producing only 54 new apartments. Further, neighbourhoods like Sorgenfri and Rosengård are being lifted to have the same appeal as Limhamn; this could eventually reduce the stock of affordable housing as neighbourhoods across the city experience increasing rents.

Because difference in implementation of sustainability measures is minimal, it likely that residents across socioeconomic boundaries receive the same tools to live in an environmentally friendly way. In fact, Rönneby was the most energy efficient housing project and will likely be the most affordable. This is significant because Rönneby demonstrates that economy, livability, and ecology aspects can complement each other and be found together in one housing site.

Communication of environmental standards does not seem to be used as a tool to sell housing projects. In section 3.2, this thesis described the Vancouver's Eco-density program which used the word "eco" to sell a program that promised densification, but had negative consequences for equity in the city (Rosol, 2013). This is not the case in Malmö's typical municipal housing. Instead, the creation of a multi-purpose housing development is being used to sell rental housing as seen in the case of Föraren and Limhamn's developments.

It becomes important to make a distinction in what may cause inequity in the city. While eco-gentrification may seem to be the obvious answer given the city's own marketing of itself as a place for innovative environmental solutions, the potential for inequity may lie in the city's and MKB's strategy for lifting the attractiveness and livability of certain neighbourhoods. These two aspects – ecology and livability – may become conflated to the outsider since Malmö has taken great care to promote "eco" projects like Bo01, Greenhouse, and Augustenborg Eco-city. Yet, while green amenities, like sustainability measures, may play a role in polarization in the city, they are unlikely to be the primary driver of eco-gentrification since their distribution

is largely equitable and the measures themselves are not at the levels of the aforementioned projects. Rather, it is the enhancement of livability in residential housing that may spur neighbourhood transformation. Rosol's (2013) discussion of Vancouver's Eco-density program exhibited this distinction as the "eco" selling point was conflated with the program's goals of improving the livability of the area.

This is another key point: sustainability measures are not a stand-alone selling tool, but are being used in the context of building a mixed, multi-purpose environment. This is the epitome of a liveable urban space – a place in which the residential and commercial facets are simultaneously engaged and facilitated by the built environment. The risk is that the ecology aspect will be obscured by the livability aspect. As the physical space and how people use it and are affected by it becomes a primary focus, it is important to maintain an emphasis on the ecology aspect: reducing environmental impact may seem to go hand-in-hand with creating a multi-purpose, liveable environment, but the focus on increased consumption and business growth that go along with it may have unintended consequences for the environment. Restaurants and shops encourage increased consumption and unmanaged waste from these services has a negative environmental impact. In Sorngenfri, the promotional efforts and strategy to revitalize the neighbourhood may alter the culture of the area. Rent prices may increase as the neighbourhood becomes more attractive.

This discussion demonstrates how unpacking environmental justice into the aspects of the Sustainability Prism can reveal nuances in what is termed eco-gentrification. While a city may use environmental sustainability as a way to reinvent itself and promote a post-industrial image, it does not necessarily translate into typical residential projects. For example, projects like Bo01 and Greenhouse may have been used in the city's marketing, but their use of advanced environmental solutions was purposeful: they were highly ambitious to recreate the industrial image (in the case of Bo01) and to revitalize a neighbourhood with advanced environmental solutions (in the case of Greenhouse). More typical housing projects that are not meant to be flagship projects have more moderate environmental measures and are more focused on improving livability than using innovative environmental solutions.

Malmö may not be unique in this regard. The post-industrial landscape is littered with stories of environmental programs being used as part of an urban regeneration story. It is interesting to investigate whether the selling of green amenities is notable in a few flagship developments and absent in more typical residential development. The placement and distribution of these flagship green amenities has an impact on environmental justice in the city. However, the focus of this research was municipal residential housing where environmental standards were not overly ambitious – rather livability and the multi-purpose development was used as the selling point.

6.3 Using the Sustainability Prism to understand environmental justice

Using the Sustainability Prism as a way to understand environmental justice has been useful as a way to deconstruct the larger concept into manageable aspects. In addition, economy, ecology, livability, and equity are productive lenses through which to study green amenities because they touch upon all aspects of the definition of eco-gentrification: "implementation of environmental or sustainability initiatives that lead to the exclusion, marginalization, and displacement of economically marginalized residents" (Pearsall and Anguelovski, 2016: 6). In

other words, it can be described as the implementation of *ecology*-related measures, meant to make a place *liveable*, that affect the *economy* and *equity* in an area.

The Sustainability Prism was especially useful in studying a historically welfare-focused, now neo-liberalising city because of the city's changing values in its trajectory from industrial to post-industrial. Economy, ecology, livability, and equity contend for primacy at different stages of this transition. Analysing through the Sustainability Prism highlights the increasing attention to the ecology aspect, especially as it becomes used to bolster the economy aspect. Finding similar results by viewing other Scandinavian cases through the Sustainability Prism is unlikely, however, due to each area's unique culture and historical context. Nevertheless, the post-industrial urban regeneration story is a great fit for the aspects of the Prism.

By separating out the aspects, this thesis found that green amenities in typical residential housing are unlikely to drive eco-gentrification because they are not advanced measures that go much beyond what is required by regulation. In fact, the sustainability measures described in this thesis may not deserve the term green amenities. Green amenities have much more of a power to drive polarization in ambitious R&D-driven projects like Augustenborg Greenhouse because they are ambitious environmental solutions in socioeconomically deprived area. In more typical housing, livability is the component that is being improved and may lead to inequity in the city.

This distinction is important to the discussion of environmental justice as it separates out two aspects that may be conflated in other research. Eco-gentrification describes the negative unintended consequence of green amenities, the "ecology" aspect of the Sustainability Prism. However, it is the livability aspect that is emphasized in more typical residential housing. Thus, eco-gentrification, though perhaps a result of ambitious R&D projects, is less driven by sustainability measures in more representative residential housing. It also points to the green-washing that may be used to sell livability-focused programs as "eco"-friendly.

Limitations of using the Sustainability Prism include the limited analysis of cultural and historical that drive policy decisions and influence environmental sustainability and the built environment. This thesis included some of these driving forces in their connection to the aspects of the Sustainability Prism. For example, Sweden's historic welfare tendencies were captured by the study of equity in the city.

Further, the Sustainability Prism is specific to the period of time to which it is applied. In other words, it can assess the past and the present but the evolution between the two time periods can only be studied by comparison. This thesis compared industrial and post-industrial Malmö to understand how the weight given to different aspects of the Sustainability Prism shifted over time. The drivers behind the shift, however, are more difficult to discern.

7 Conclusion

This thesis investigated environmental justice in a post-industrial in the context of its built environment. The Sustainability Prism was used to break down environmental justice into four components: economy, ecology, equity, and livability. This latter aspect allowed a study of the other aspects in the built environment, leading to an investigation of green amenities and eco-gentrification.

The city of Malmö was chosen as a case study due its unique position as a neo-liberalising post-industrial economy located in a welfare state. The city once faced the problem of moving away from its industrial past onto a path that promised investment, brought in business, and appealed to a wealthier class. The dominant discourse then was creating a knowledge-based city. Environmental projects like Bo01, Eco-city Augustenborg, and the Hyllie development demonstrate the city's use of sustainability as a way to create a clean image that breaks away from the industrial past.

Malmö has cemented itself as an attractive place for investment and innovation, but the question of addressing the polarization in the city has remained. This thesis investigated environmental justice in the city due to its use of the aforementioned projects to project a “clean” and “green” image. The study of green amenities was undertaken to understand their effects on socioeconomic inequality in the city.

The findings showed that environmental justice issues in the city may partly be the result of the historical lack of attention to factors promoting environmental sustainability during industrial times. This can be seen in the case of the Miljonprogrammet which emphasized equity and livability but has since become outdated in its environmental efficiency measures. This housing is also the site of higher concentration of lower-income residents and has been highlighted in the dialogue around polarisation in Malmö.

In the present-day, livability has obscured environmental sustainability as a selling factor for the city. Though the two aspects interact with each other and livability is dependent on ecology, typical residential housing built by Malmö's municipal housing company, MKB, demonstrated that livability-focused development strategies have taken the helm, while ecology-focused development strategies are largely unambitious compared to flagship projects like Bo01 and Greenhouse. Instead, they emphasize multi-purposeness: a mixture of housing and commercial activities to attract a variety of residents and business into an area. Marketing for Culture Casbah also highlights these aspects, indicating a shift in the city's place-marketing.

Using the Sustainability Prism allowed this research to separate out the effects of livability-focused development and ecology-focused development. This is important to the study of environmental justice because ecology aspects are sometimes used to sell programs that are actually more focused on livability and do not have extremely innovative environmental solutions (perhaps leading to a risk of city green washing). In the case of Malmö, it allowed a differentiation between flagship projects, whose green amenities may negatively influence equity in the city, and more typical residential projects such as the ones studied in this thesis, which rather use livability as a marketing tactic for residents and new business.

The implication for environmental justice is that residents across Malmö's neighbourhoods and socioeconomic classes are exposed to equivalent energy efficiency standards, mobility options, and climate adaptation of green roofs – the green amenities studied in this thesis. These standards improve the livability and attractiveness of neighbourhoods while also curbing

environmental impact (what is called “ecology” in this thesis). The economy aspect of the Prism no longer relies as strongly on green measures – rather, the focus now seems to be building a mixed community to appeal to a variety of socioeconomic classes and, through that, improve the standard of living in the neighbourhood.

While this research has shown little variation in sustainability standards in housing built by the municipal housing company, a more robust study could dig into the impact of green renovation. The relation of upgrading and greening of Miljonprogrammet housing to increasing rent pressures and tenant displacement can be further studied in the context of Malmö (Baeten *et al.*, 2017; Baeten & Listerborn, 2015). Further, a longitudinal study of rental prices and tenant retention as these variables are related to newly built housing and renovated housing across the city of Malmö could reveal more interesting linkages that the time span and limited data of this research was unable to uncover. By monitoring the make-up of tenants in rental housing over time and any implemented renovations, research can provide insight into the magnitude of the impact that upgrading has on tenant displacement. This discussion is connected to that of eco-gentrification since renovations have the ability to put a premium on rent, leading to unaffordable housing.

This research focused exclusively on housing projects planned by the municipal housing company. This focus was guided by the desire to understand the role of MKB’s transformation in an increasing neo-liberal city. However, the private real estate sector also plays a significant role in influencing the socioeconomic distribution of the city. The exclusion of the private sector from the scope of this study limited the study of eco-gentrification in the city of Malmö. Future research should include the private real estate sector given that it takes up a significant portion of the real estate market.

Finally, additional indicators would need to be studied in order to understand how environmental upgrading relates to socioeconomic area. The choice of indicators for this research was influenced by the city’s environmental targets and MKB’s own goals. However, they were not found to be unique and may not even be considered green amenities. Other measures that were not studied in this research but could be included in the future would be more technical measures such as choice of building materials and weather proofing mechanisms, as well as more visible measures like the recycling and bike repair centre, ReTuren, found in Sorgenfri.

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Zinkernagel, R. (2017, March 22). Personal interview.

Appendix A Photos from site visits

All photos taken by author during site visits.



Föraren: On-site promotional material for Föraren describing the mixed-use commercial zone



Föraren: On-site promotional material for Föraren describing the bus park: “The park should be like a hide away...The design on the site should be a harmony between the industrial...and the lush greenery and calm atmosphere...and industrial paradise”



Föraren: On-site promotional material for Föraren: describes the ReTuren recycling station

Appendix B List of people and organisations interviewed

People and organisations interviewed:

Guy Baeten, Professor at Department of Urban Studies, Malmö högskola

Jenny Holmquist, Environmental Strategy at MKB

Roland Zinkernagel, Environmental Department for City of Malmö

Jens Kindt, Project leader for Rönnen at MKB

Janna Jonborn, Project leader for Rönnen at MKB

Anders Ihre, Real estate at MKB

Martin Grander, Doctoral candidate in Department of Urban Studies, Malmö högskola

Tor Fossum, City Planning for City of Malmö

Stefan Klemt, Project leader for Gjuteriet at MKB

Jannice Engman, Project leader for Föraren at MKB

The Swedish Union of Tenants (Hyresgästföreningen)